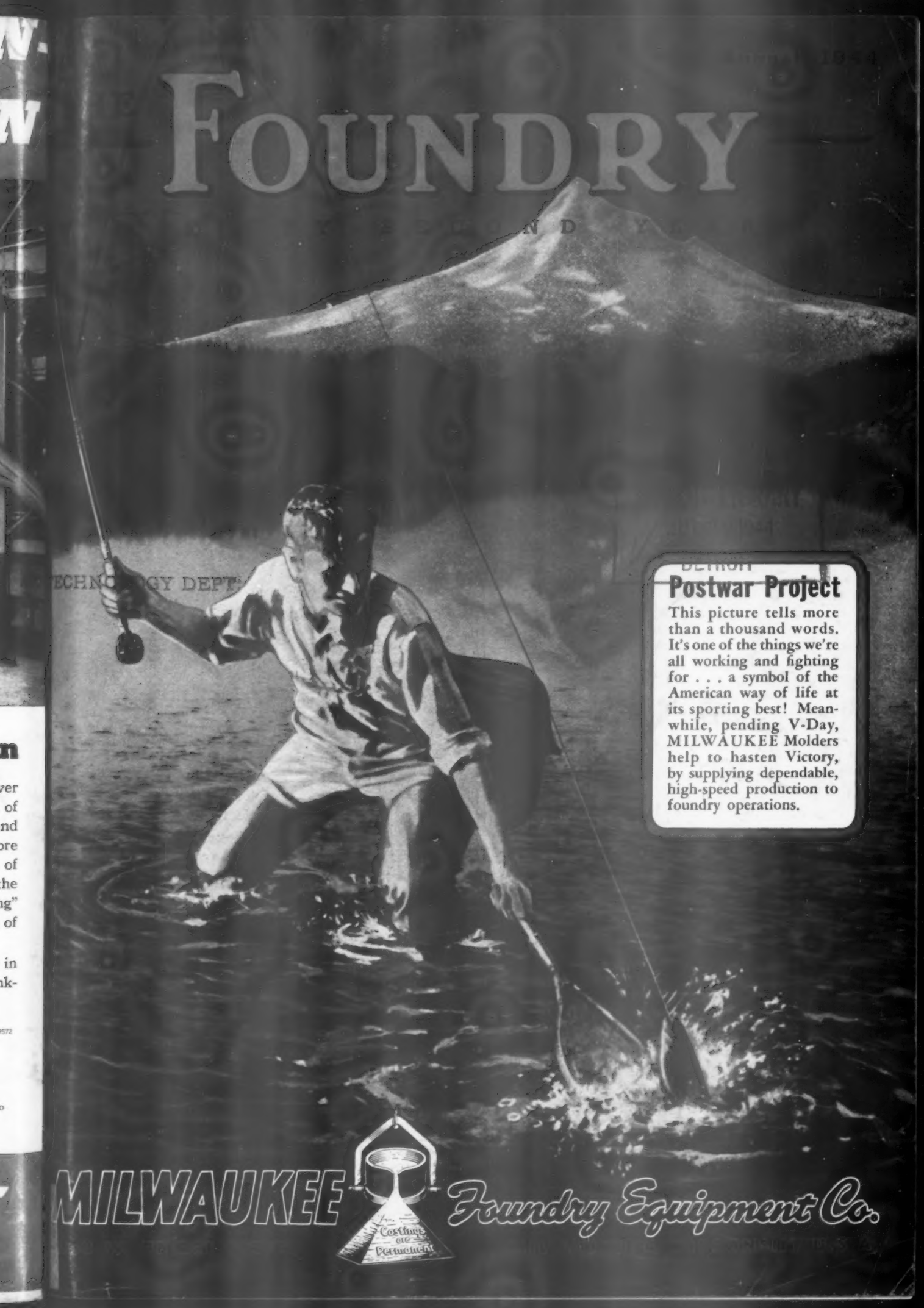
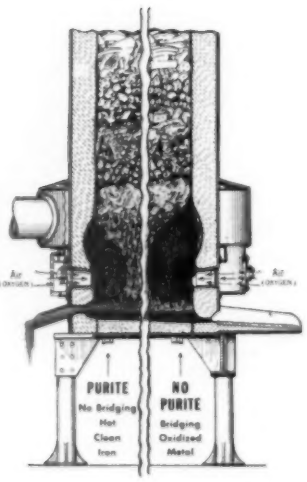

FOUNDRY
Postwar Project
This picture tells more than a thousand words. It's one of the things we're all working and fighting for . . . a symbol of the American way of life at its sporting best! Meanwhile, pending V-Day, MILWAUKEE Molders help to hasten Victory, by supplying dependable, high-speed production to foundry operations.
MILWAUKEE
Foundry Equipment Co.

SPEED PRODUCTION OF SOUNDER CASTINGS

PURITE restricts the combustion zone to a smaller, hotter area in front of the tuyeres, prevents bridging and reduces oxidation of the metal.



Purite is used with limestone in the ratio of 1 part Purite to 10 parts stone on the bed coke and 1 part to 20—40 parts stone on regular coke charges.

To insure sounder, better machining castings, use Purite

Refining with Purite, whether in the cupola or in a mixer ladle, purges the molten metal of oxides and silicates which produce sluggish iron, shrinkage and segregation defects.

Purite pays dividends in better cupola operations and cleaner stronger castings.

Can you afford to overlook this means of improving your competitive position in the castings industry.

THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

PURITE

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

In Canada: Railway & Power Engineering Corporation, Limited

Meet Ev Jackson

You'd probably like knowing Everett C. Jackson. He was born in Illinois and now lives in Baltimore. He's thirty-four and married, and he holds a job at Bethlehem's ship-repair yard on Key Highway in Baltimore.

Soon after Pearl Harbor, Everett Jackson left the yard to join the Army. A first-aid man in the Medical Corps, he survived the sinking of the troopship on which he was bound for Guadalcanal, and later took part in the invasion of Rendova and New Georgia.

He served on New Georgia for twenty-seven days, under continuous bombing and strafing, and finally was badly wounded. After that, there were months in hospitals, then the Purple Heart and a medical discharge. Then the return to civilian life—and his old job with Bethlehem.

"Working here," says Everett Jackson, "is the next best thing to being out there fighting. I know they need the ships that I'm helping to repair at Key Highway. I only wish more people could understand how real that need is."

★ ★ ★

Like Everett Jackson, other veterans of World War II are joining, or rejoining, the Bethlehem production army in steady numbers. Over 11,000 ex-service men, nearly half of them former Bethlehem employees, have been employed by us in steel-making, in ordnance production, and in building and repairing ships.

To their jobs these veterans are bringing great resources of willingness, efficiency, and adaptability—and a marked desire to be treated by the same standards that apply to other civilians. Some of them are moving ahead to added responsibilities—to higher-skilled work or supervisory duties.

Their service in the armed forces is over. But they are heartened by realizing that through their jobs in steel plant or shipyard they are still helping directly to bring the war to an early and victorious end.

★ ★ BETHLEHEM STEEL ★ ★

WORLD'S LARGEST SHIPBUILDER

SECOND LARGEST STEEL PRODUCER

Shipbuilding and Ship Repair Yards . . . Quincy, Hingham, East Boston, Mass. . . . Staten Island, Brooklyn, N. Y. . . . Hoboken, N. J. . . . Baltimore, Sparrows Point, Md. . . . San Francisco, Alameda, San Pedro, Calif.

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100 LBS. NET
FEDERAL
GREEN BOND
REG. U.S. PAT. OFF. NO. 243459
IS A 100% MINERAL SAND-BOND
OF PROVEN, PRACTICAL QUALITY
USED IN ALL CLASSES OF FOUNDRY
SAND IN GREY IRON, MALLEABLE
AND STEEL FOUNDRY PRACTICE
SOLD with SERVICE
Manufactured By
THE FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND, OHIO. • UPTON, WYO.
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GREEN BOND

Uniformity

THAT PAYS YOU!

UNIFORMITY OF MATERIAL—Pays you by eliminating the need to check your bentonite-sand mix, once you have established it. Constant control from mine to bag means that Federal Green Bond is uniform from bag to bag or car to car.

UNIFORMITY OF GRIND—Pays you by the rapidity with which it blends evenly with your sand. With today's high speed production you need a bentonite that is ground to mix in the least possible time. Air separation of every particle of Green Bond assures its uniform fineness.

UNIFORM WEIGHTS—Automatic valve packing reduces weight variations from bag to bag to an absolute minimum. You'll never have trouble with batch-to-bag mixes when you use "The Best of the Wyoming Bentonites."

FEDERAL GREEN BOND...

Best of the Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

THE FOUNDRY

for

AUGUST 1944

VOLUME 72 NUMBER 8

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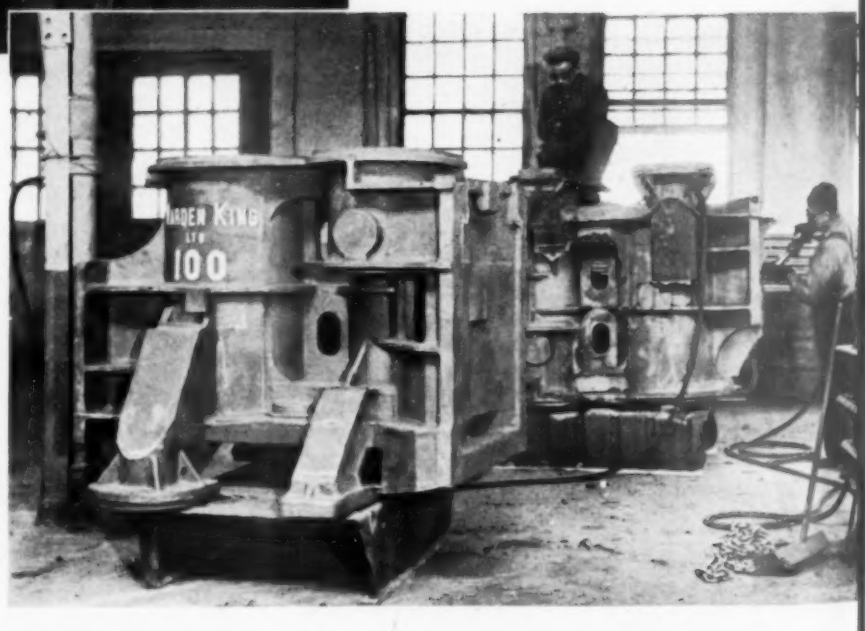
IN CANADA

AS POPULAR IN
AS IN THE STATES

WAR WORK OF WARDEN KING, MONTREAL, is MARINE ENGINES

After heating Canada for nearly a century this "Grand Old Name in Heating" is now helping make it warm for Germany. But it isn't boilers and radiators. It is 7300 pound cylinder castings for 2500 hp. triple expansion steam engines for cargo vessels. The castings which must stand a hydraulic test of 340 pounds per square inch are Linoil cored.



To the right is the 100th casting ready for delivery to Canadian Vickers, Ltd., with chippers working on the 101st. Above are some of the men who work on the big castings. They are H. Castle, molder; J. McKay, coremaker; F. Smith, clean room foreman; C. Fordham, Sr., coremaker; M. Dubrieul, coremaker; E. Malo, molder; P. Descarries, foreman pattern maker; W. Nuttall, foundry foreman; R. Campell, core room foreman; J. Riley, coremaker. Superintendent E. N. Delahunt and J. I. Robinson, Vice President and General Manager, have just stepped into the picture at the left.

THE WERNER G.

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

IT'S LINOIL

IN THE DOMINION
TES—THE LOGICAL OIL

The line dividing the United States from Canada does not divide the foundry craft. Same workmen, same materials, same castings, same knowledge of what's good in core oil, and in general practice.

LINOIL

Result is that Linoil is as popular in Canadian production and job shops as it is from coast to coast in the United States foundries. North, south, east, west.

Every foundryman knows instinctively and from experience how important is the absolute uniformity always assured in Linoil. Uniformity, cornerstone of efficiency.

Every foundryman knows the saving he makes in the cleaning room where the Linoil cores are shaken out so quick and clean. Labor saving when labor counts.

Every foundryman knows what it means to have perfect cores come to the molders—perfect as to specifications, perfect as to even drying, and containing little of a gas-forming nature. Every foundryman knows that Linoil besides being the most satisfactory oil to use is also the most profitable to use. And profits are desirable in both the United States and Canada.

SMITH COMPANY

DANIELS - MIDLAND COMPANY)

4690 CLEVELAND 2, OHIO

"We've come a long way since 1904"

Forty years ago Pangborn Corporation made and sold its first Blast Cleaning machine. Ever since, we have made our customers' problems OUR problems—and the engineering of equipment to meet these problems has been our ceaseless endeavor.

This policy resulted in an enviable record of "long-time" customer relationship. In the period immediately preceding the war 80 per cent of all Pangborn business was repeat business.

Today, Pangborn Air Blast, ROTOBLAST,* and Dust Control installations are standard production units in large and small plants throughout industry. They improve cleaning qualities, shorten cleaning time, and lower cleaning costs. If you have a cleaning room problem—and want to get prompt and practical relief—"COME TO PANGBORN."

WORLD'S LARGEST MANUFACTURER OF BLAST

NSA CD 1944

PANG

PANGBORN CORPORATION . . . . . .

ANTIQUE. Here is one of the first Pangborn Blast Cleaning Machines, and we are just as proud of it now as we were 40 years ago when it was built. Today it is still operating effectively—only the efficiency of our modern equipment indicates the length of the road along which experience has carried us.

ROTOBLAST* PERFORMANCE

SPEED. A typical Pangborn ROTOBLAST* Barrel cleans soft iron in 6 to 8 minutes time, and hard iron in from 12 to 16 minutes. Operator fills Loading Skip while Barrel is blasting.

LOW COST. Uniformity of finish, reduction of "rejects", efficiency of abrasive reclaiming, economy of space, simplified operation, fewer moving parts—are proved facts which make the ROTOBLAST* Barrel the right answer for quality work at low cost.

*Trade Mark of Pangborn Corporation for airless blast cleaning.

CLEANING AND DUST CONTROL EQUIPMENT

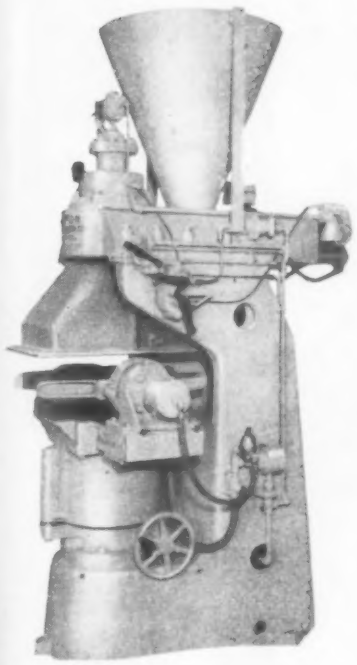
BORN

ARMY E NAVY
For excellence in production

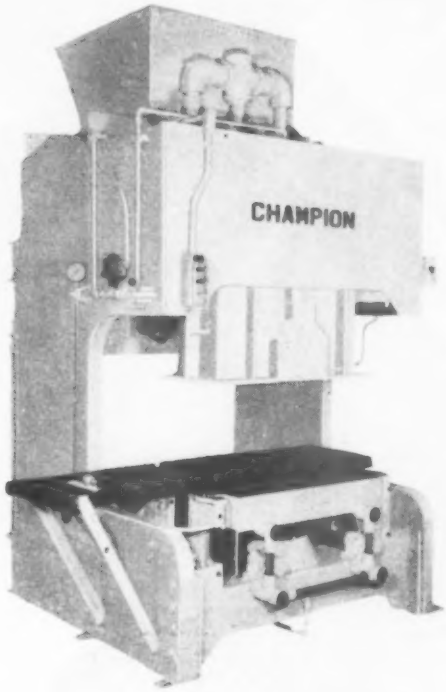
. . . . . HAGERSTOWN, MARYLAND

CHICAGO JULY 7, 1944
Meeting Here Seeks Labor To Solve Castings Crisis
The "critical" status of the gray iron castings industry as a factor in war production and the steps being taken to help it keep pace with other war programs were discussed before a special manpower-price control conference of the Gray Iron Founders Society, Inc., at the Stevens Hotel yesterday.
Dean William H. Spencer, regional director of the War Manpower Commission, explained how the new system of "priority referrals" on male labor may aid the foundry situation and suggested measures the companies could take to attract workers.
William B. Murphy, deputy vice-chairman for production, War Production Board, declared that heavy truck production for June fell 32 per cent behind schedule and said that 70 per cent of the lag is due to shortage of castings. Production of light trucks fell about 12 per cent behind schedules for the same reason, he said.
Murphy asserted that while from 200 to 275 foundries are suffering from a critical shortage of labor there is need for an increase of 20 to 25 per cent in castings for trucks and tanks.
Dean Spencer explained that the gray iron castings industry was a stepchild in the early days of war production and that with a shortage of orders much foundry labor had drifted away to more attractive jobs.
Now the forges and foundries are in need of 15,000 to 20,000 men, they have been granted top priorities, and have been placed on the "must programs" list, he said.
Any man, woman, boy or girl can produce perfectly rammed cores the CHAMPION way

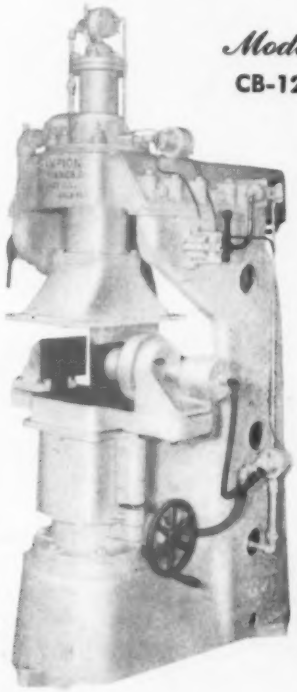
Any man or woman — boy or girl can produce perfectly rammed cores on a Champion Core Blower by merely setting the box and pulling the lever. In a single second small or large cores are perfectly rammed. The working table is completely accessible with no obstructions, so that cores are produced faster, more economically and more accurately without need for highly trained labor.



Model CB-15



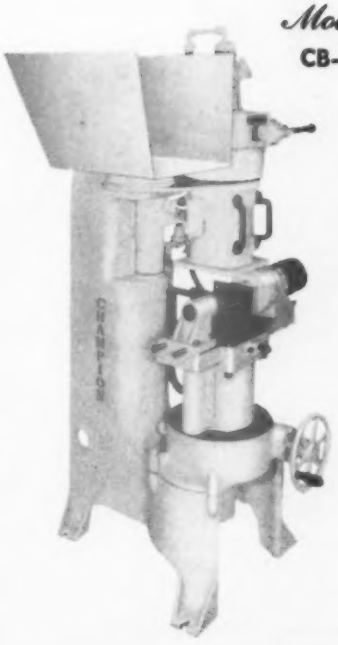
Model CB-400



Model CB-12

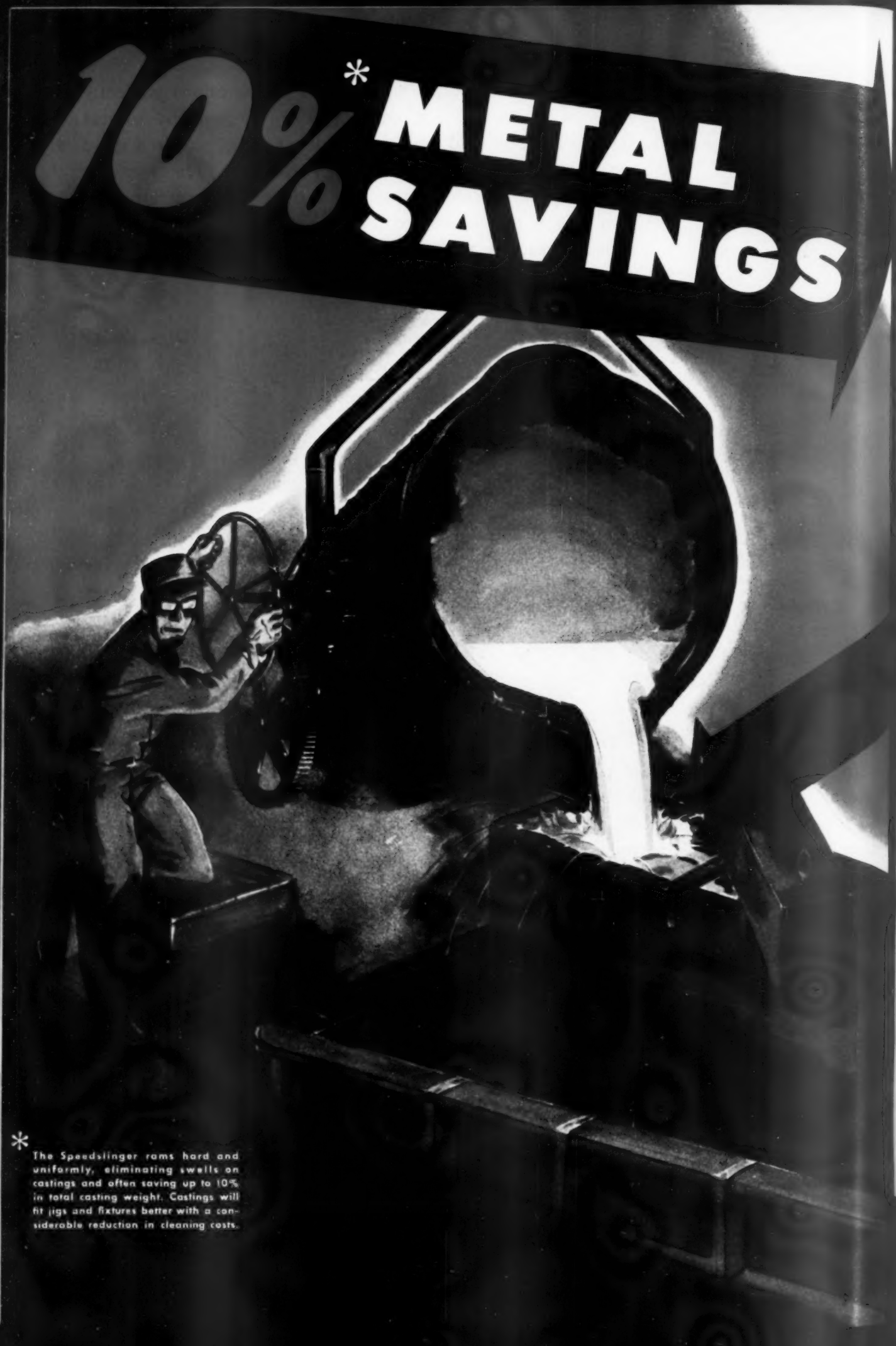
A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle. Rigid one-piece, cast steel frame insures accurate alignment of core box and blow plate. Patented Air-Operated Hydraulic Clamp locks the core box securely against split box separation.

Today, Champions are doing their part to hurry America's war effort. Tomorrow, these same Champions will continue to earn greater profits for their owners through faster, more accurate, more economical production of cores.



Model CB-8

CHAMPION
FOUNDRY & MACHINE CO.
1318 WEST 21st STREET, CHICAGO 8, ILLINOIS



* The Speedslinger rams hard and uniformly, eliminating swells on castings and often saving up to 10% in total casting weight. Castings will fit jigs and fixtures better with a considerable reduction in cleaning costs.

WITH SPEEDSLINGER RAMMED MOLDS!

For medium and large jobbing work, the Speedslinger will deliver and ram one ton of sand per minute or 60 tons per hour at an average cost of .003 cents per cu. ft., as compared to .08 per cu. ft. for hand filling and air ramming, or a ratio of 27 to 1 in favor of the Speedslinger!

Speedslinger operator sits in this seat directing every function of the machine through centralized finger-tip control. Men or women—even those inexperienced in operating machinery—can easily and accurately control the Speedslinger.

Metal saving is just *one* advantage of the Speedslinger. Its hard, uniform ramming helps to improve casting quality . . . its ramming capacity of up to a ton of sand per minute speeds production and increases the productive capacity of the floor space it occupies. It will ram all types of molds, small, medium and large, and has the flexibility to operate over pits, molds and large cores. It makes an amazing contribution in man-savings—having the capacity to do the ramming for 50 molders per 8 hour shift!

The Speedslinger requires no elaborate or expensive sand handling system. It carries its own sand to the job in the kind and quantity needed. Traveling on a track under its own power, it can easily reach all types of molds within a ramming radius of up to 25 feet.

Inquire now about the Speedslinger. Write for booklet giving engineering data and specifications—or ask to have a B & P Sales Engineer call to recommend the proper method of installation in your foundry. Write today!

THE BEARDSLEY & PIPER COMPANY

2541 North Keeler Avenue, Chicago 39, Illinois

THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF SPEEDSLINGERS, SPEEDMULLORS, SANDSLINGERS, SCREENARATORS, MULBAROS, SHAKE-OUTS, SAND CONDITIONING MACHINES, GYRATORY SCREENS

HARDENED....GROUND....CHROME PLATED

HINES PINS AND BUSHINGS

FOR ALL PATTERN PLATES AND FLASKS

WILL NOT RUST OR STICK

•

No Lubricant Required

•

.002" Tolerance

•

IMMEDIATE SHIPMENT FROM STOCK

THE BUSHINGS—Round or oblong, held in place by simple lock washer and jam nut. Accurate and hardened. Made in two lengths for thick or thin plates. Easy to install. Sets of tools consisting of two wrenches and one counterboring tool take care of all installations.

THE PINS—Round or Hexagon, hardened, ground and chrome plated. Extremely accurate, will not stick or rust. Made in various sizes with long or short shanks. Thousands of Hines Pins and Bushings are already in use, eliminating a great source of trouble for the pattern shops. Write for complete details.

THE HINES FLASK CO.

1324 HIRD AVENUE — CLEVELAND 7, OHIO

6,000 ROYERS now in service!

Royer Model "NC-2". Capacity 450 to 550 lbs. per minute.

The Royer "Jr." Capacity 150 to 250 lbs. of sand per minute.

Combination Model "NDC". Capacity 20 to 25 tons per hour.

This is a message of appreciation to the many foundries who are using Royer Sand Conditioners.

During the years we have served the foundry industry we have been proud of our small contribution to the progress made in sand conditioning.

When the first Royers were put to work in foundries, the time-honored riddle was the accepted equipment for sand conditioning. The riddle is still standard equipment in far away lands where but a few Royers are installed to date. Too, there are a few foundries in the United States where the riddle is employed and a number of modifications of it have been introduced.

In designing the Royer, we discarded the inadequate riddling, or screening principle, entirely. Being practical foundrymen ourselves, we knew what characteristics perfectly conditioned sand should embody. We developed the Royer —with its combing belt in place of screens—to deliver those characteristics, now widely known as "Royer Six Point Sand Conditioning." At the same time we produced a rugged machine which functions with a minimum of labor.

How well Royers have achieved their objective is attested by the number in service and the large proportion of repeat orders—most welcome assurance to us that they are giving satisfactory service. Likewise gratifying are such incidents as the recent replacement of a Royer which had been in service for over twenty years. During this war production era we are happy to feel that we have helped by making it possible for so many foundries to have properly conditioned sand—so important to the making of sound armament castings.

There's a Royer model and size for every foundry illustrated and described in our new Catalog No. 744. Write for your copy.

THE ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

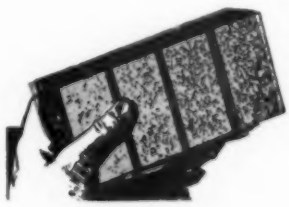
FOREMOST IN SAND CONDITIONING EQUIPMENT

"put your secretary on the phone"

DOUBTLESS your secretary does many favors for you pleasantly and efficiently.

If you want her to do a little one that is capable of bringing great and lasting results, ask her to phone MAin 6063—Cleveland.

Have her tell the pleasant young lady who will answer, to send literature describing Famous CORNELL Cupola Flux and request Mr. Cornell to call at his earliest convenience to explain the many advantages that will accrue from its consistent use.



This will put promptly into action a step that may have been in your mind—that possibly has been deferred because of the pressure of many other matters.

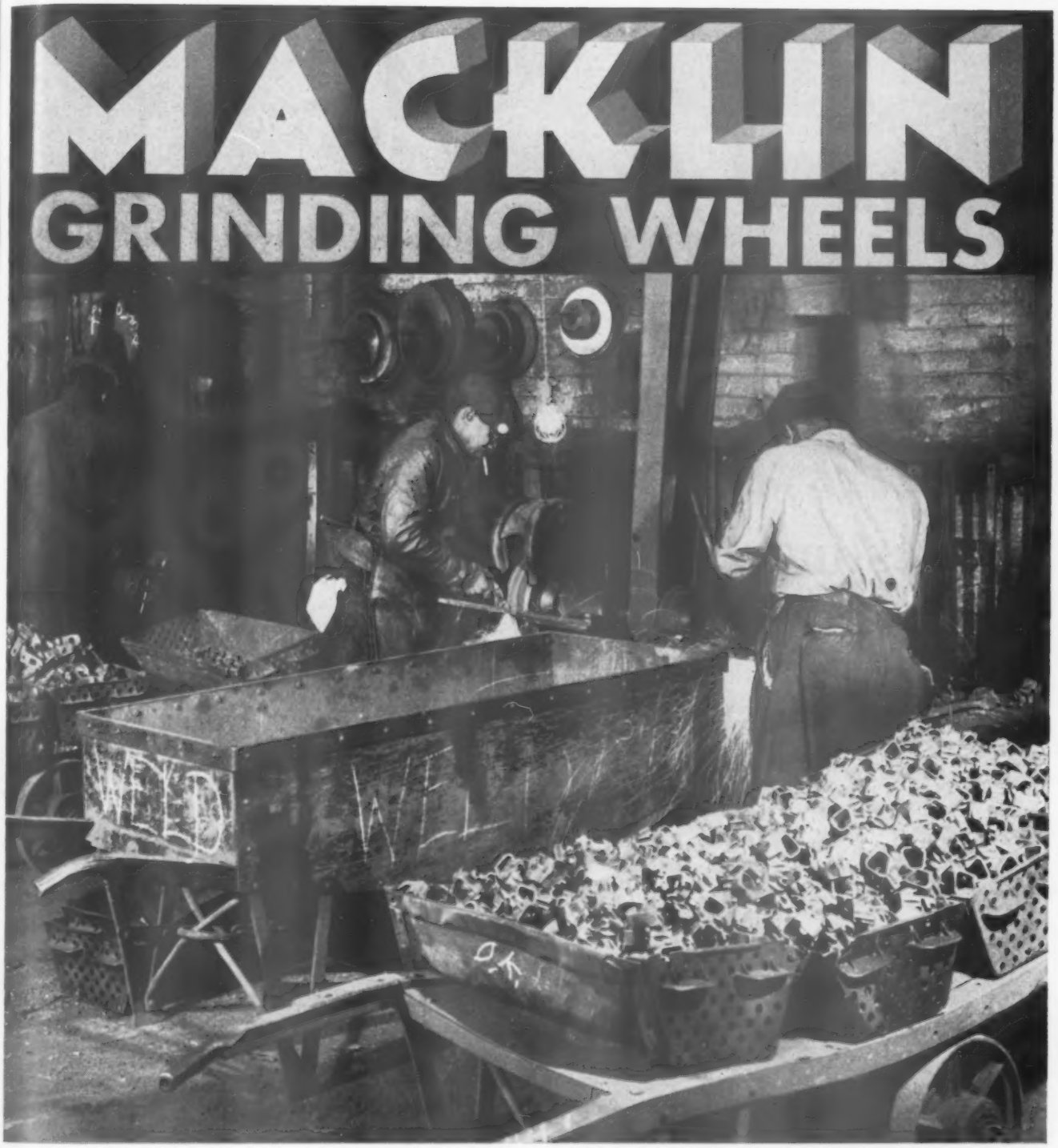
Do it now and you'll be grateful again for the efficient little lady who helped introduce you to Famous CORNELL Cupola Flux.

The CLEVELAND FLUX *Co.*

Manufacturers of Iron, Brass and Aluminum Flux Since 1918

1026-36 Main Ave., N. W.
CLEVELAND, OHIO

MACKLIN GRINDING WHEELS



FOUNDRIES, large and small, require grinding wheels in many sizes, shapes, grains and grade combinations.

Macklin Company is thoroughly equipped to produce high quality grinding wheels for all foundry requirements.

No matter what your grinding problems may be there is a Macklin wheel to fit the job that will "Protect Your Production."

Ask for the services of a Macklin Field Engineer.

Invest in War Bonds

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS—JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices:—Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

WHEN YOU NEED

Motor Control Accessories

consult Westinghouse Buying Data

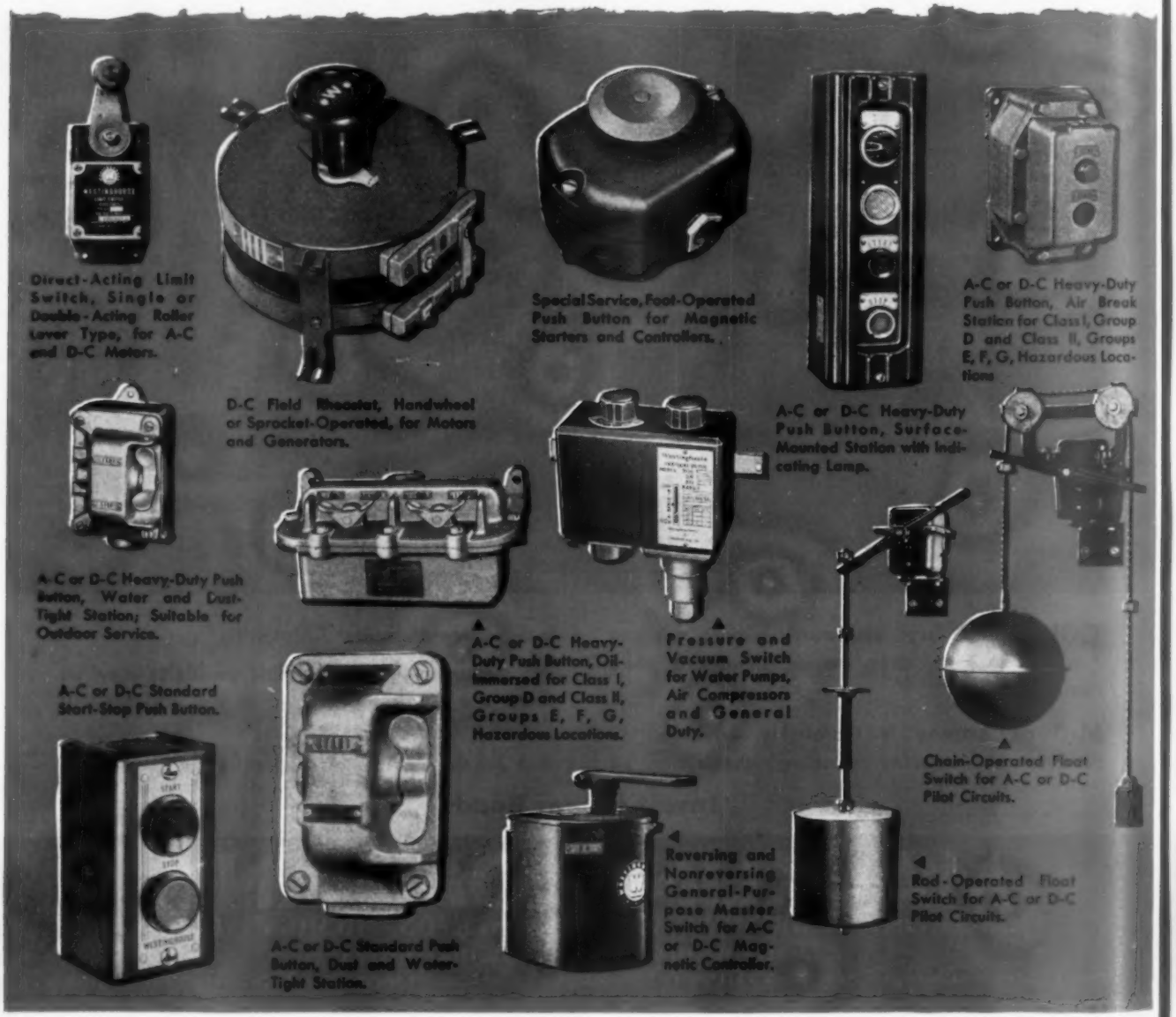
(NEW CATALOG 7000)

With the new Westinghouse Buying Data, you can select and purchase the proper motor control in half the time.

Data, as presented, is striking in its newness. It's easier to read, easier to understand, and easier to use than any published previously by any manufacturer.

Chances are—if you are a buyer of motors and controls—that you have already received a copy of this new Catalog 7000 by mail. However, if you have not received your copy, write, wire or phone your nearest Westinghouse district office. (Requests will be filled through district offices only — no mailing from Westinghouse headquarters at East Pittsburgh.) J-60551

Westinghouse PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE *Control Accessories*


Direct-Acting Limit Switch, Single or Double-Acting Roller Lever Type, for A-C and D-C Motors.
D-C Field Rheostat, Handwheel or Sprocket-Operated, for Motors and Generators.
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A-C or D-C Heavy-Duty Push Button, Water and Dust-Tight Station; Suitable for Outdoor Service.
A-C or D-C Heavy-Duty Push Button, Oil-Immersed for Class I, Group D and Class II, Groups E, F, G, Hazardous Locations.
Pressure and Vacuum Switch for Water Pumps, Air Compressors and General Duty.
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Electromet Facts *for Foundrymen*

In addition to providing a full line of high-quality ferro-alloys and alloying metals, Electro Metallurgical Company can serve you in other important ways:

Experience—We have a background of over 37 years of experience in producing ferro-alloys, and our store of information on the use of alloys is available to the foundry industry.

Development—We maintain modern laboratory facilities for developing new ferro-alloys and for solving industrial metallurgical problems. Developments from this research include alloys for ladle and cupola additions, properly prepared to meet foundry needs . . . calcium-silicon, SMZ alloy, CMSZ alloy, S.M. ferrochrome, and EM silicon, chromium, and silico-manganese briquets.

Service—A staff of technically trained metallurgists render on-the-job assistance to foundrymen in the use of ferro-alloys. Because they have practical shop experience they are qualified to suggest the grades and sizes of alloys best suited for your particular use.

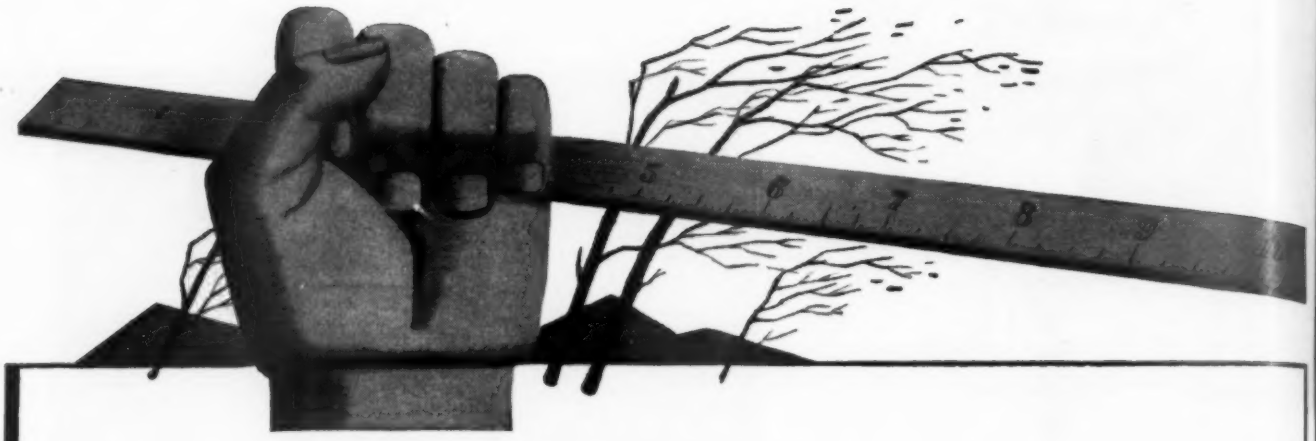
Literature—Booklets and reprints of technical articles give information of the correct use of ferro-alloys. Among these are "Chromium in Cast Iron," "SMZ Alloy and Its Uses," "Briquetted Alloys for the Cast Iron Foundry," and "Electromet Products and Service." Write for any of these that can help you.

Facilities—Our plants have been greatly expanded to meet the current demands for ferro-alloys. Warehouses and sales offices are strategically located throughout the major foundry districts to insure prompt shipments on emergency and normal orders. Electromet Ferro-Alloys and Metals are distributed through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada they are sold through Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

"Electromet," "CMSZ," "SMZ," and "EM" are trade-marks of Electro Metallurgical Company.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street New York, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Trade Mark
Ferro-Alloys & Metals



PUT A YARDSTICK on your AIR!

WHAT is your air costing you—in horsepower used — in capacity delivered?

An economical answer to those questions can be found in one machine—the Gardner-Denver "RX" Single-Stage Horizontal Compressor.

It's built to deliver a *big* air output at remarkably *low* horsepower requirement.

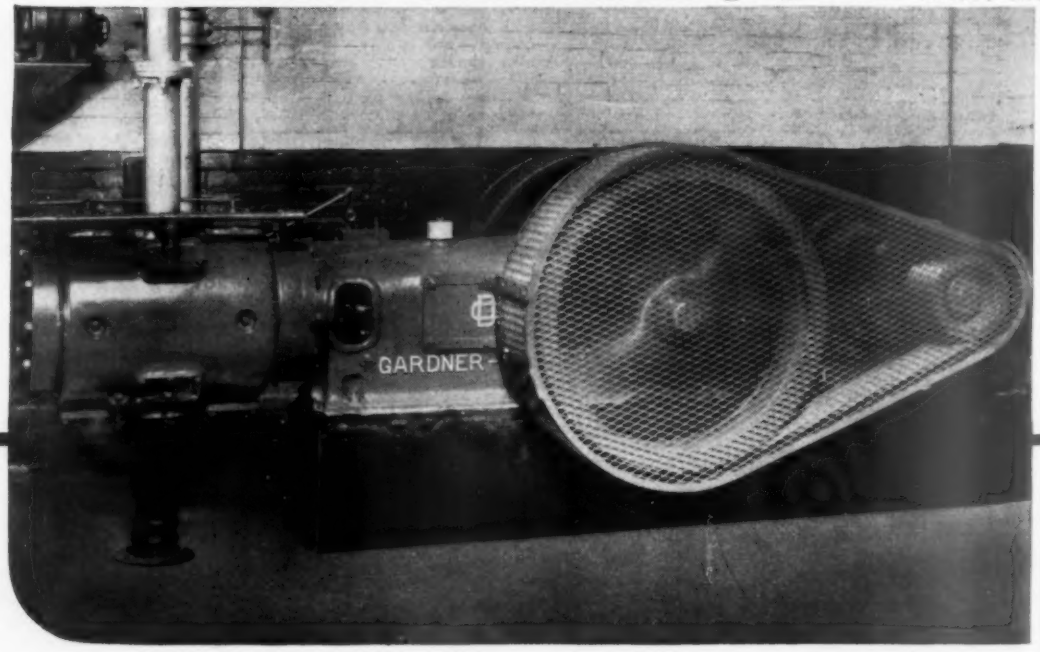
HERE'S WHY

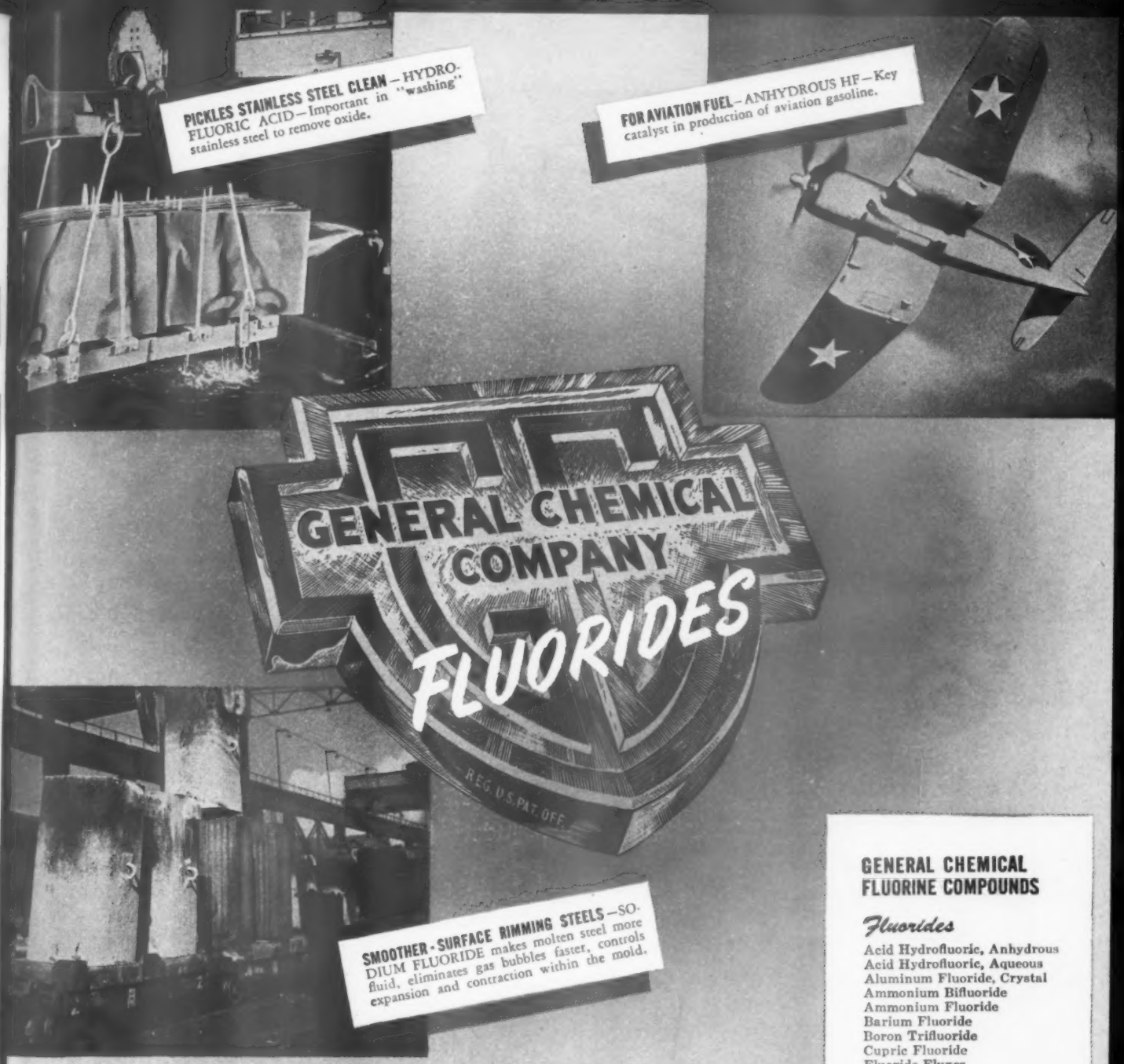
1. **Valve and port areas engineered for highest efficiency.**
2. **Air output is under constant automatic control—automatically regulated to fit air needs.**
3. **Low maintenance assured through rugged, dirt-free construction.**
4. **"Air-Cushioned" Duo-Plate valves are silent in operation—seldom require more than routine cleaning and inspection.**

For complete information and specifications on the economical "RX" Compressor, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER

Since 1859




PICKLES STAINLESS STEEL CLEAN—HYDROFLUORIC ACID—Important in "washing" stainless steel to remove oxide.
FOR AVIATION FUEL—ANHYDROUS HF—Key catalyst in production of aviation gasoline.
GENERAL CHEMICAL COMPANY
FLUORIDES
REG. U.S. PAT. OFF.
SMOOTHER-SURFACE RIMMING STEELS—SODIUM FLUORIDE makes molten steel more fluid, eliminates gas bubbles faster, controls expansion and contraction within the mold.

General Chemical Leads With Fluorides

New, improved chemical "tools" are today's demand in industry. General Chemical, always anticipating such requirements, is America's foremost producer of a wide range of Fluorides, Fluoborates, and Fluosulfonates.

The ever-increasing scope of General Chemical's research will continue to meet the growing needs of industry for many new Fluorine Compounds.

Research and industrial chemists are invited to avail themselves of the accumulated knowledge gained by General Chemical's Fluorine Division in more than a quarter century of progressive research and industrial application.

RECENTLY RELEASED: A comprehensive study of the potential applications and the physical and chemical properties of Fluosulfonic Acid. Write to the nearest Technical Service Office for Technical Service Bulletin 33 A.

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40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee Minneapolis • New York • Philadelphia • Pittsburgh Providence (R. I.) • St. Louis • Utica (N. Y.)

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Fluorides

Acid Hydrofluoric, Anhydrous
Acid Hydrofluoric, Aqueous
Aluminum Fluoride, Crystal
Ammonium Bifluoride
Ammonium Fluoride
Barium Fluoride
Boron Trifluoride
Cupric Fluoride
Fluoride Fluxes
Lead Fluoride
Lithium Fluoride
Magnesium Fluoride
Nickel Fluoride
Polyacid Fluorides (e.g. KF . x HF)
Potassium Fluoride, Anhydrous
Potassium Fluoride, Crystal
Sodium Bifluoride
Sodium Fluoride
Strontium Fluoride

Fluoborates

Acid Fluoboric
Ammonium Fluoborate
Cadmium Fluoborate
Chromium Fluoborate
Copper Fluoborate
Ferrous Fluoborate
Indium Fluoborate
Lead Fluoborate
Nickel Fluoborate
Potassium Fluoborate
Silver Fluoborate
Sodium Fluoborate
Stannous Fluoborate
Zinc Fluoborate

Fluosulfonates

Acid Fluosulfonic

PORTRAITS OF PROGRESS

TRADE ABRASIVE MARK REGISTERED

RECENT "ABRASIVE" MILESTONES

RED STREAK FLANGES—For High Speed Resinoid Bonded Snagging Wheels with Large Holes.

RED STREAK BUSHINGS—for Rotor Cups.

VICTORY POINTS—Mounted Wheels and Points with Patented Demountable Spindles.

ABRASIVEWAY—Newest Development in Drill Sharpening.

Write for FREE Information. Please ask for Grinding Wheel Data Book.

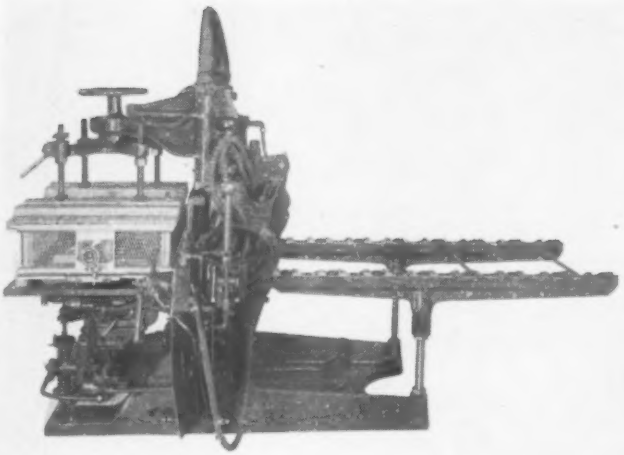
These THEN and NOW pictures of ABRASIVE COMPANY'S Main Office and Factory portray a contrast which emphasizes steady and substantial progress throughout more than half a century. This progress, built by skill, experience and research is responsible today for the wide acceptance of Abrasive Company Grinding Wheels and other Abrasive Products. It is likewise your assurance of

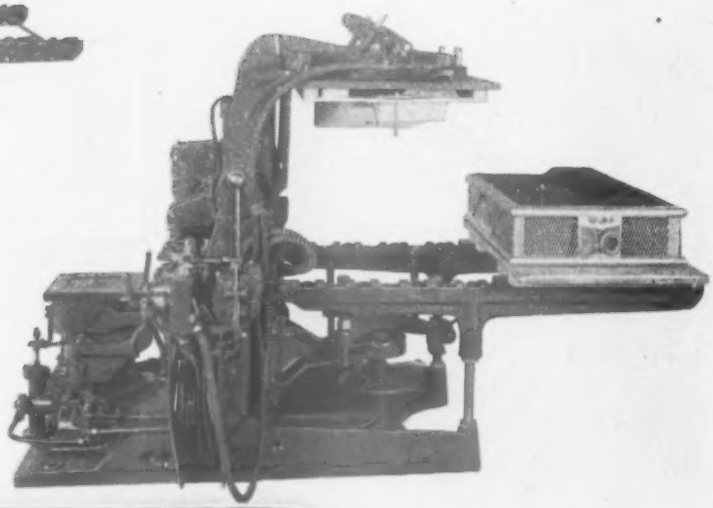
COMMANDING QUALITY *and* OUTSTANDING RESULTS

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES





Above—View of No. 815 Jolt, Roll-Over Pattern Draw Machine Clamped, Equalized, and ready for Roll-Over Operation.

At Right—View of same Machine after Rolling Over, Showing Perfect Pattern Draw.

A FAST HIGH PRODUCTION JOLT, ROLL-OVER PATTERN DRAW MACHINE FURNISHED IN THREE SIZES

• Johnston-Jennings Jolt Roll-Over Pattern Draw Machines meet every requirement for fast, easy, efficient work. They assure maximum production even with relatively unskilled operators,—and are standard equipment in most large aluminum and magnesium foundries. These machines are built in three sizes and require no pits. They are of open end construction and incorporate many design and operating refinements much appreciated by practical operating men. Our fully descriptive catalog giving complete details of this and other Johnston & Jennings molding machines furnished gladly on request — No obligation — Send for a copy today.

THE JOHNSTON & JENNINGS CO.

867 ADDISON ROAD • CLEVELAND, OHIO

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

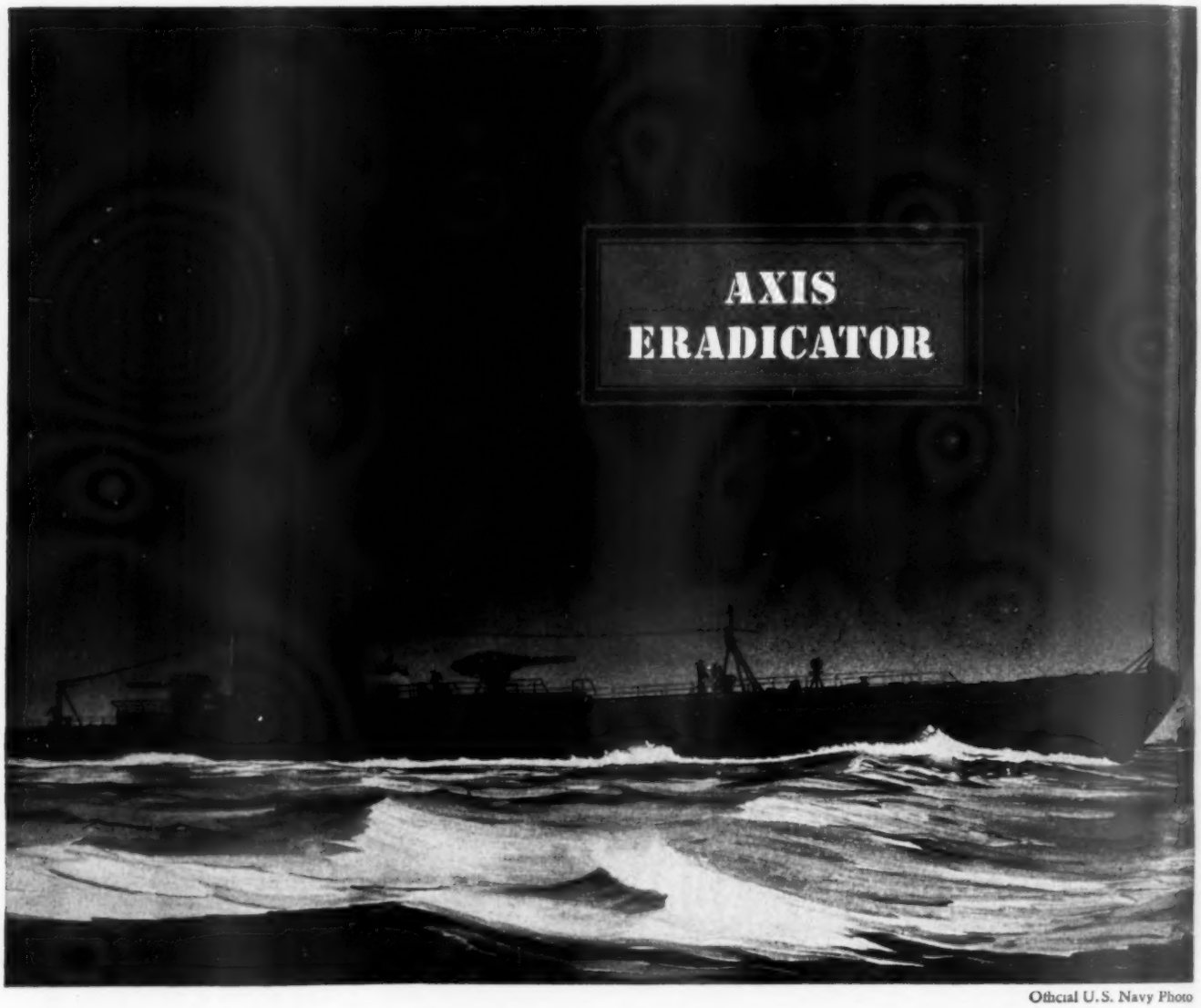
JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

Write for fully descriptive catalog giving complete specifications.



Official U.S. Navy Photo

FEDERATED Brass and Bronze Alloys

are used in ever increasing amounts by the builders of these and other "axis eradicators".

From periscope to torpedo, the submarine is a precision built instrument of destruction. It is essential that its constituent metals be above reproach in quality and uniformity.

Federated brass and bronze alloys are of uniform high quality due to advanced technical knowledge and precision control of metallurgical processes.

Federated Metals will meet your requirements and save you money. Your inquiry will receive prompt attention from the Federated Office nearest you.

INGOT METALS AND WHITE METAL ALLOYS PRODUCED BY FEDERATED

ALUMINUM
BRASS
BRONZE
DIE CAST ALLOYS
SOLDER
BABBITT
TYPE METAL
ZINC DUST

All of these in standard specifications. Special alloys to your order.

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AMERICAN SMELTING and REFINING COMPANY

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Nation-wide service with offices in principal cities

CLOSE INSPECTION

of
the good
CLEARFIELD
SAND
MIXER

reveals:

SOUND ENGINEERING
HONEST STURDY CONSTRUCTION
HIGHLY EFFICIENT OPERATION

LET
US FIGURE ON
YOUR
REQUIREMENTS

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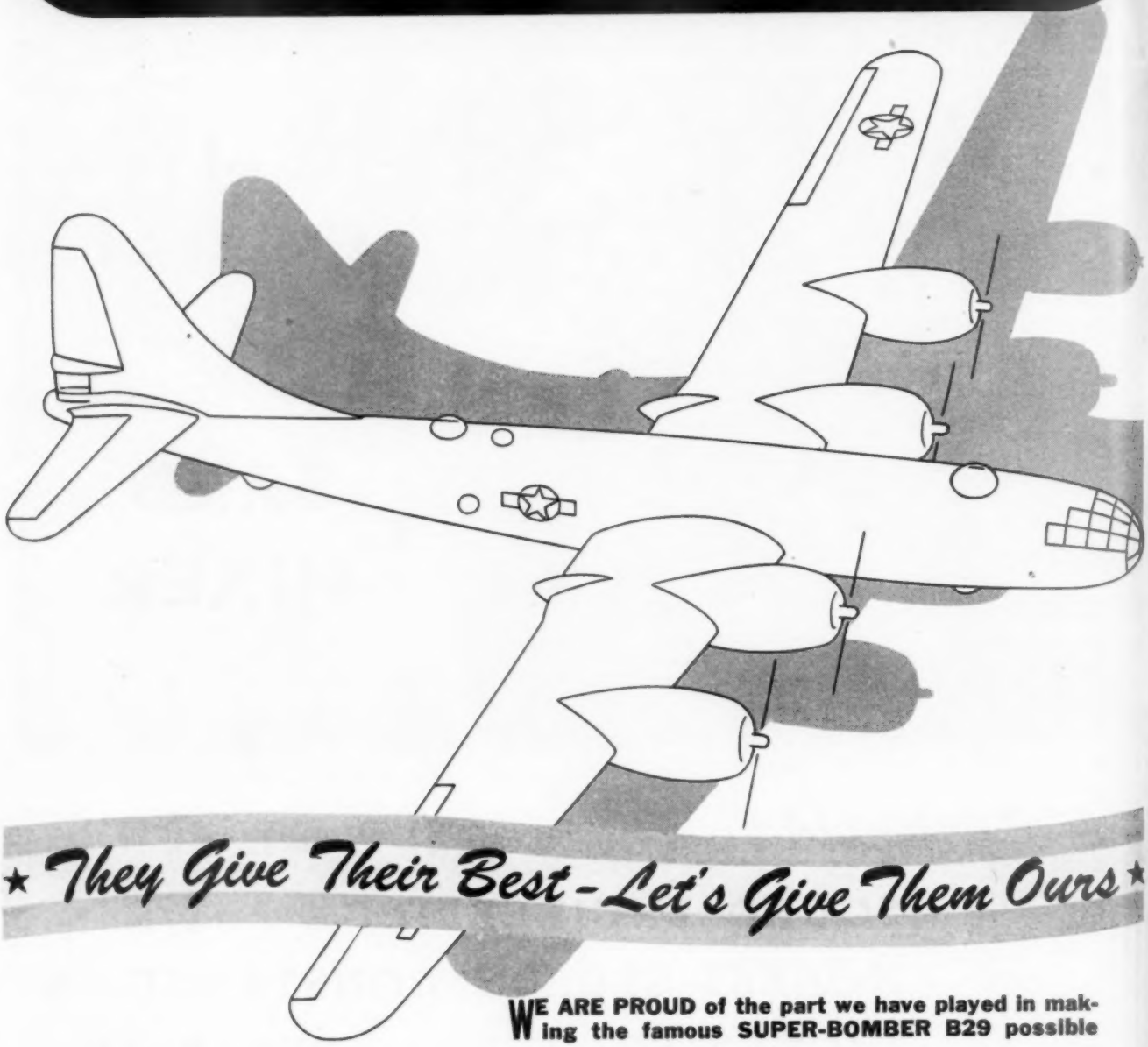
HAVE YOU BOUGHT YOUR SHARE OF THIS GREAT SHIP?

Many Ships Like This Will End This War At An Early Date



★ *They Give Their Best - Let's Give Them Ours* ★

WE ARE PROUD of the part we have played in making the famous SUPER-BOMBER B29 possible

WOOD AND METAL PATTERNS • KELLER AND DUPLICATOR WORK • MACHINE WORK • MALLORY METALS • BERYLLIUM COPPER • MONEL METAL • EVERDUR CASTINGS

COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY

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BRASS, BRONZE AND ALUMINUM CASTINGS

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LOOK INTO THIS MAGNESIUM FOUNDRY...Where Modern
DAVENPORT MOLDING MACHINES
are in ACTION producing VITAL WAR WORK faster
DAVENPORT MODERN MOLDING MACHINES are made in 33 sizes and models to meet practically every requirement for steel, malleable and gray iron—also magnesium and other non-ferrous castings. Write today for our complete catalog.
DAVENPORT MACHINE & FOUNDRY CO.
Davenport, Iowa, U.S.A.
DAVENPORT MOLDING MACHINES

AAF FURNACE HOOD

WITH TYPE W ROTO-CLONE

Assures positive Dust and Smoke Control from **ELECTRIC FURNACES**

The patented AAF Furnace Hood in combination with the Type W Roto-Clone, is an application of the basic theory of dust control—confining the smoke and fumes at the source before they can disperse to adjacent working areas, and exhausting them through a duct to a point of collection and disposal. The design of the Hood is varied to suit the type and design of the electric furnace on which it is to be used . . . either side charge or top charge. In either case, mechanisms for operation and maintenance of furnace are unobstructed.

Write for Bulletin No. 274, describing the application of the Roto-Clone to all foundry operation dust control, and Bulletin No. 278 which describes the AAF Electric Furnace Hood.

Views show top charge electric furnace equipped with AAF Furnace Hood. Upper picture shows furnace tilted for pouring or slagging with exhaust duct disengaged. Picture at right shows charging operation with furnace roof and circular Hood section swung to one side.

ROTO CLONE

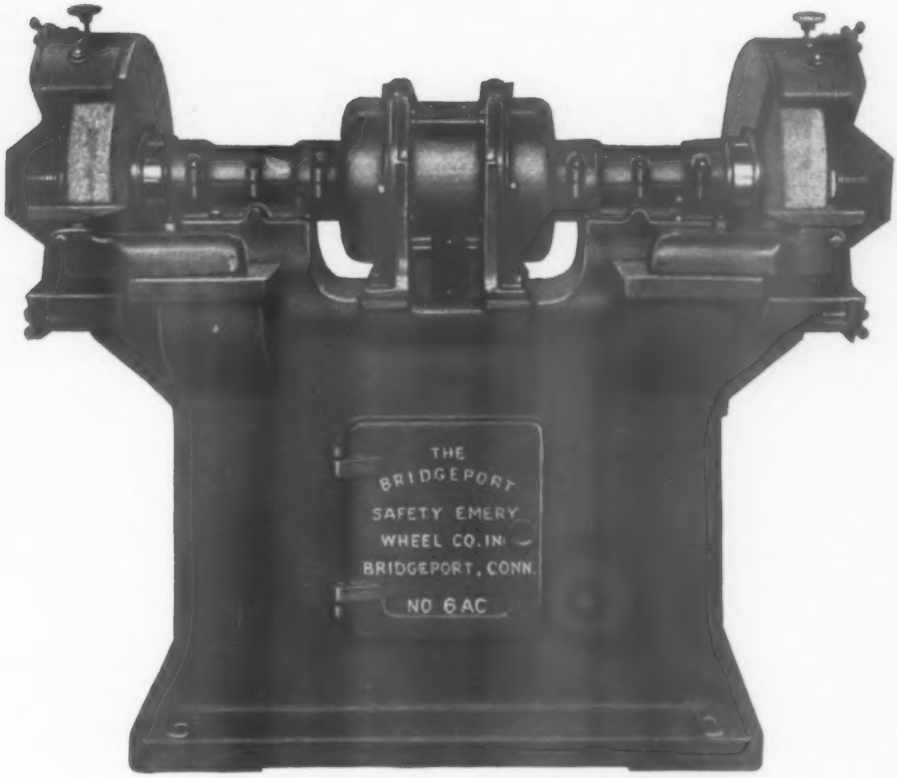
FOR FOUNDRY DUST CONTROL

AMERICAN AIR FILTER COMPANY, INC.

INCORPORATED

266 Central Avenue • LOUISVILLE, KENTUCKY

In Canada: DARLING BROS., LTD., MONTREAL, P. Q.



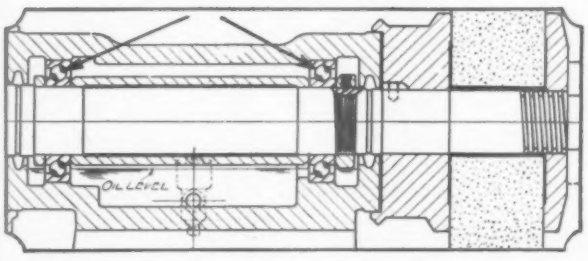
"BRIDGEPORT" No. 6AC HEAVY DUTY GRINDER

Licks the Toughest Snagging Without a "Grunt"!

Here's a floor grinder that will rock any foundry snagging or off-hand grinding job back on its heels! And there's every reason why it should. Besides being extra-powered with a motor built for long, cool running and high shock resistance, the grinder itself is a marvel of ruggedness accurately distributed.

Note spindle assembly diagram. Four sets of deep groove ball bearings uniformly distribute motor and grinding loads. Two bearings carried in each housing, all four precision aligned. Spindle itself is of high carbon steel of large diameters accurately balanced.

NOTE THE FOUR SETS OF OVERSIZE BALL BEARINGS



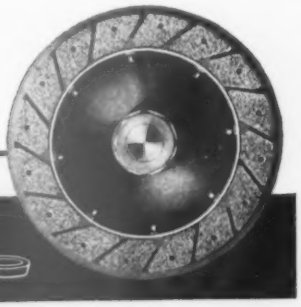
Great care has been given the lubrication. Large oil sumps in each spindle housing afford lubrication over a long period, also provide a considerable volume of still oil which serves as a settling area for worn particles and foreign matter. The system is practically wear-proof!

No. 6AC, shown above, is powered with a 5 H.P. A.C. motor. The full "Bridgeport" line of floor grinders ranges from 3 H.P. to 15 H.P., in eleven types. Glad to send complete printed information.

BRIDGEPORT SAFETY EMERY WHEEL CO., INC., BRIDGEPORT, CONN.

Bridgeport

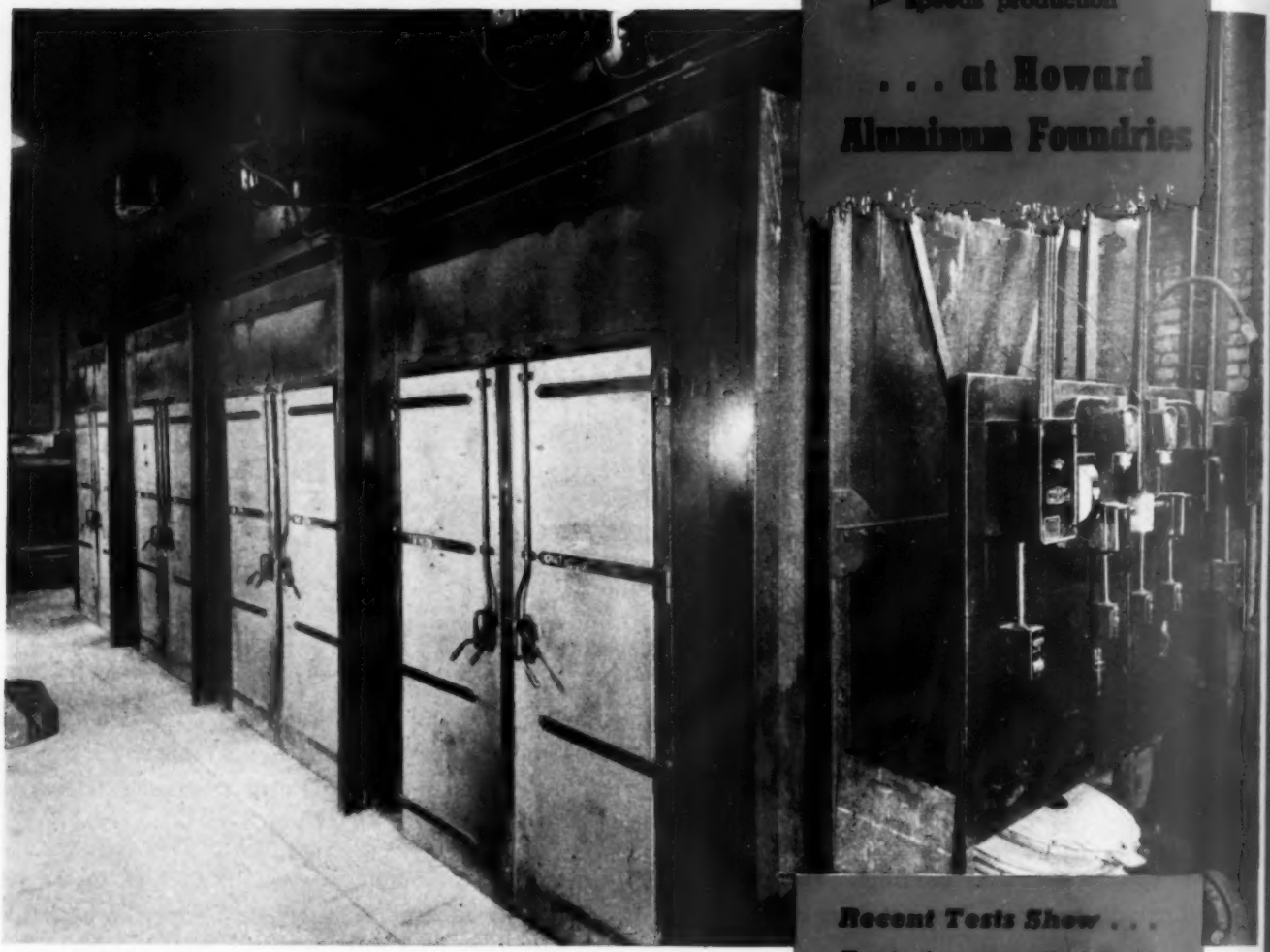
GRINDERS • GRINDING WHEELS • BUFFING LATHES



BATTERY OF 4 MAEHLER CORE OVENS

- reduces baking time
- produces more evenly baked cores — no green or burned cores
- speeds production

. . . at Howard Aluminum Foundries



Recent Tests Show . . .

That in these ovens (4 of the 48 Maehler units at the Howard Foundries in Chicago) cores for aluminum castings are baked with a maximum degree of uniformity. One of the ovens accommodating 8 large cores (31 inches square) on 2 large racks requires one hour and five minutes to reach a temperature of 450° F. It requires only three hours of baking time at this temperature. Reports show that temperature uniformity is virtually perfect.

INEFFICIENT core ovens can play havoc with your production schedules as well as your operating costs. Maehler re-circulating air heat ovens can help you keep these important factors in line. The re-circulating air heat principle, originated by Maehler, assures you of *perfect* heat uniformity resulting in more uniformly baked cores, elimination of core loss and shorter baking time.

The installation shown above at the Howard Aluminum Foundries, is an example of how today's top-flight foundries are using Maehler ovens for faster core baking. These Maehler gas-fired units handle the baking of the largest cores in three hours at 450° F. (These cores measure about 31 inches square, 10 inches deep through center and 4½ inches deep around edges.)

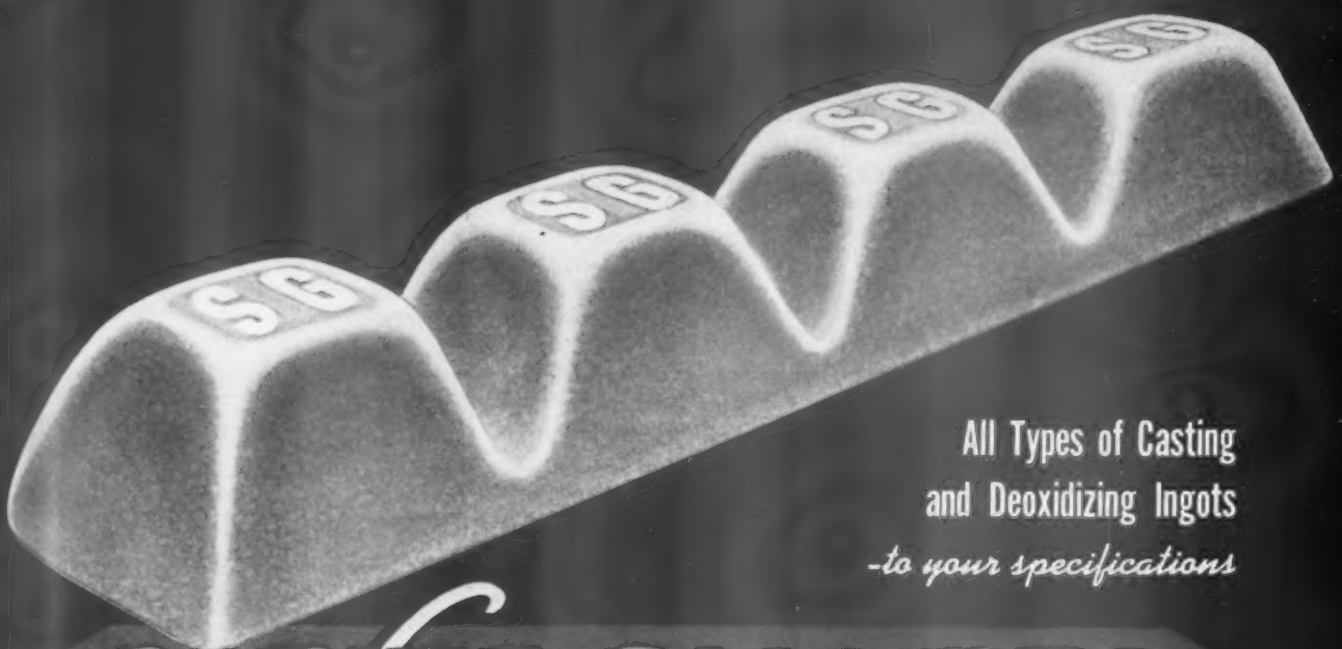
Maehler core and mold ovens are available in a complete range of gas fired, oil fired and electrically heated units for producing better, more evenly baked cores — faster at less cost. Call a Maehler engineer today or write for latest bulletins.

THE PAUL MAEHLER COMPANY
2200 W. Lake Street, Chicago 22, Illinois

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling etc.

Specify S-G Aluminum ALLOY INGOT

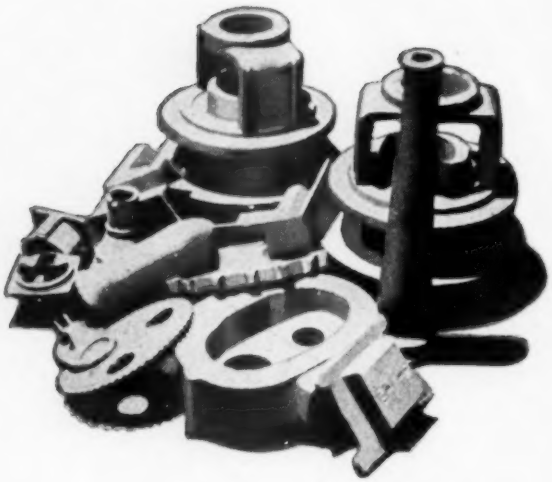


All Types of Casting
and Deoxidizing Ingots
-to your specifications

SONKEN-GALAMBA
Corporation

(MEMBER ALUMINUM RESEARCH INSTITUTE)

Riverview at 2nd Street · Kansas City, 18, Kansas



WHAT ABOUT THE OXIDES IN YOUR IRON?

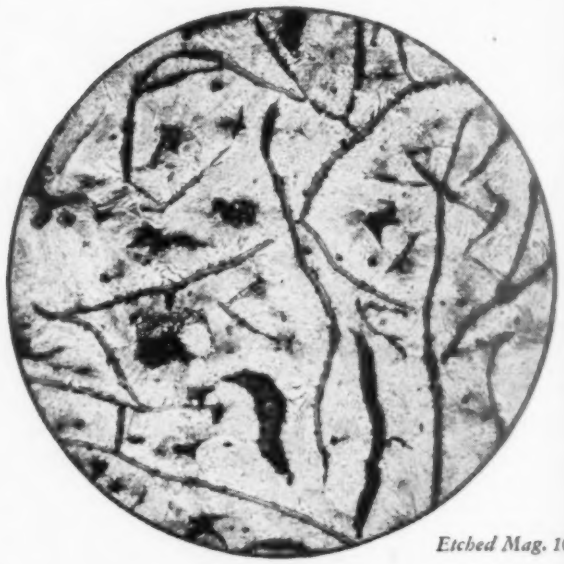
Don't overlook the value of deoxidizing in the cupola. Experience shows that the difference between *good* or *inferior* castings is often due to the degree of deoxidation attained. An easy, economical way to obtain satisfactory deoxidation is by the addition of "Ferrocarbo" briquettes to the cupola charge. Accompanied by a liberation of heat, the chemically combined deoxidizing elements in "Ferrocarbo" readily dissociate in the melting zone and react with all oxides to give you a thoroughly deoxidized and superheated iron.

Good castings are consistently produced from "Ferrocarbo"-processed iron. Put "Ferrocarbo" to work in your foundry and get—

1. **Super-heated iron of greater fluidity**
2. **Denser, finer grained, higher strength castings**
3. **Freedom from hard spots—improved machinability**
4. **Fewer rejects**

"Carborundum" and "Ferrocarbo" are registered trade marks of, and indicate manufacture by, The Carborundum Company.

Unetched Mag. 100x



Etched Mag. 100x

Effective deoxidation is important not only from the standpoint of eliminating defects, but also in obtaining the type of grain structure, density of matrix and random type of graphite pattern desired.

The above photomicrographs show the structure of cast iron deoxidized with "Ferrocarbo."

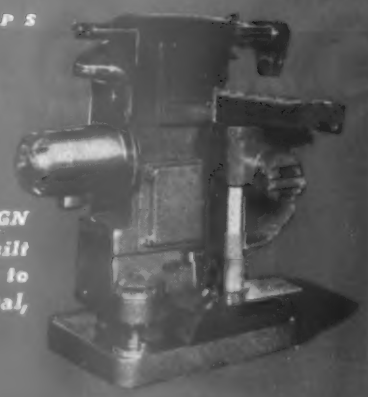
WRITE for more information on this effective deoxidizing agent.

THE CARBORUNDUM COMPANY
Refractories Division, Perth Amboy, N. J.

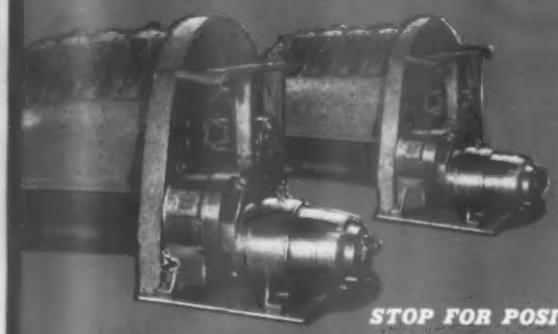
"Ferrocarbo" distributors:
KERCHNER, MARSHALL & COMPANY, Pittsburgh and Cleveland
MILLER & COMPANY, Chicago, St. Louis and Cincinnati

Ferrocarbo by CARBORUNDUM
TRADE MARK

BUY UNITED STATES WAR BONDS AND STAMPS



SIMPLE COMPACT DESIGN
The electric brake is built into the motor end cover to form a compact, economical, easy to use unit.

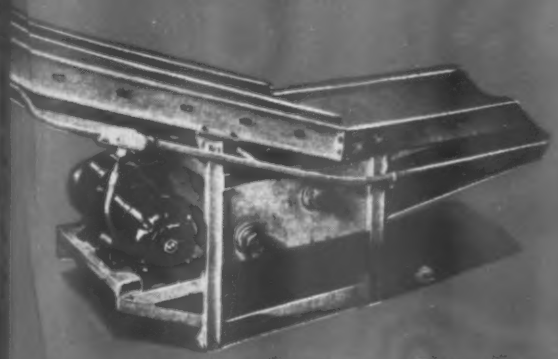


STOP FOR POSITION
Stop at the desired point for quickly and conveniently loading and unloading

MASTER UNIBRAKE MOTORS

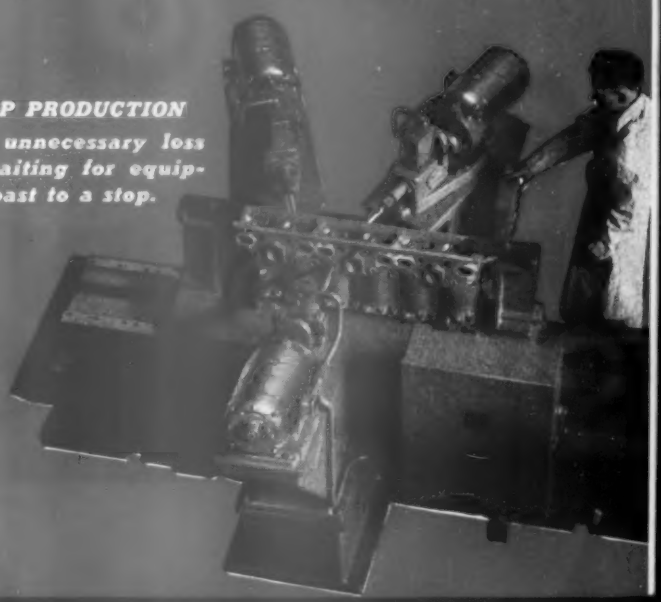
1/10 TO 100 HORSEPOWER

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO



STOP AND HOLD ANY LOAD
Unibrake motors are very advantageous on hoists, elevators, inclined conveyors, etc....

SPEED UP PRODUCTION
Eliminate unnecessary loss of time waiting for equipment to coast to a stop.



YOUR LINK-BELT SPEEDER HAS GONE TO WAR—

ON FRONTS ALL OVER THE WORLD!

Link-Belt Speeder Zephyrcrane operating in plate shop area.

These steel gratings are used for tanker runways and catwalks.

Link-Belt Speeder loading material on tanker at outfitting docks.

LINK-BELT SPEEDERS ON HEAVY-DUTY WORK

IN MARINSHIP CORP. YARDS AT SAUSALITO, CALIFORNIA

Buy More Bonds and Hold Them Until Maturity!

LINK-BELT SPEEDER

Builders of the Most Complete Line of

SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.

(A DIVISION OF LINK-BELT COMPANY)

X-Ray on wheels

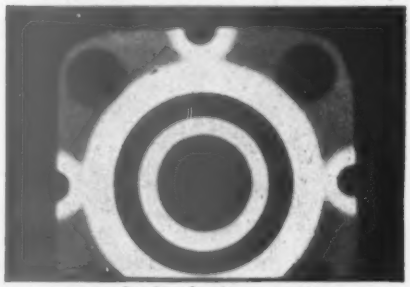
this powerful Mobile 150 KVP X-Ray Unit brings non-destructive x-ray inspection to any part of your plant.

"ON THE SPOT" RADIOGRAPHY The Picker 150 KV Mobile Unit brings comprehensive facilities for X-Ray inspection directly to any point of production in your plant.

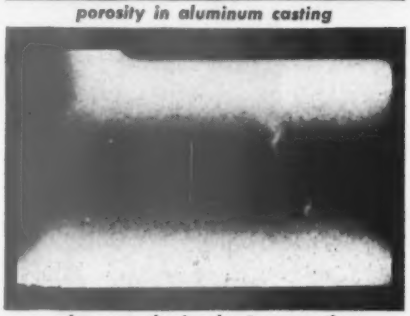
This compact, powerful, easily transportable apparatus fulfills every requirement for production inspection or spot checking of many diverse materials . . . metals, plastics, fabric, wood. Completely self-contained, requiring only a current source, the Picker 150 KV Mobile Unit provides positively controlled voltages from 15 KV to 150 KVP, with a radiographic capacity (with screens) up to 1½" of steel and 7" of aluminum. The rapidity of exposures ideally adapts this Unit to consecutive production inspection.

Write today for our bulletin on the Picker 150 KV apparatus, which gives details of construction, capacities and applications. Our engineering staff and research bureau is at your service for the study of any special problems concerning non-destructive radiographic examination.

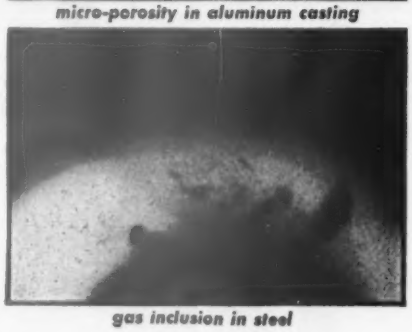
Some typical examples of defects disclosed by non-destructive radiography



porosity in aluminum casting



micro-porosity in aluminum casting



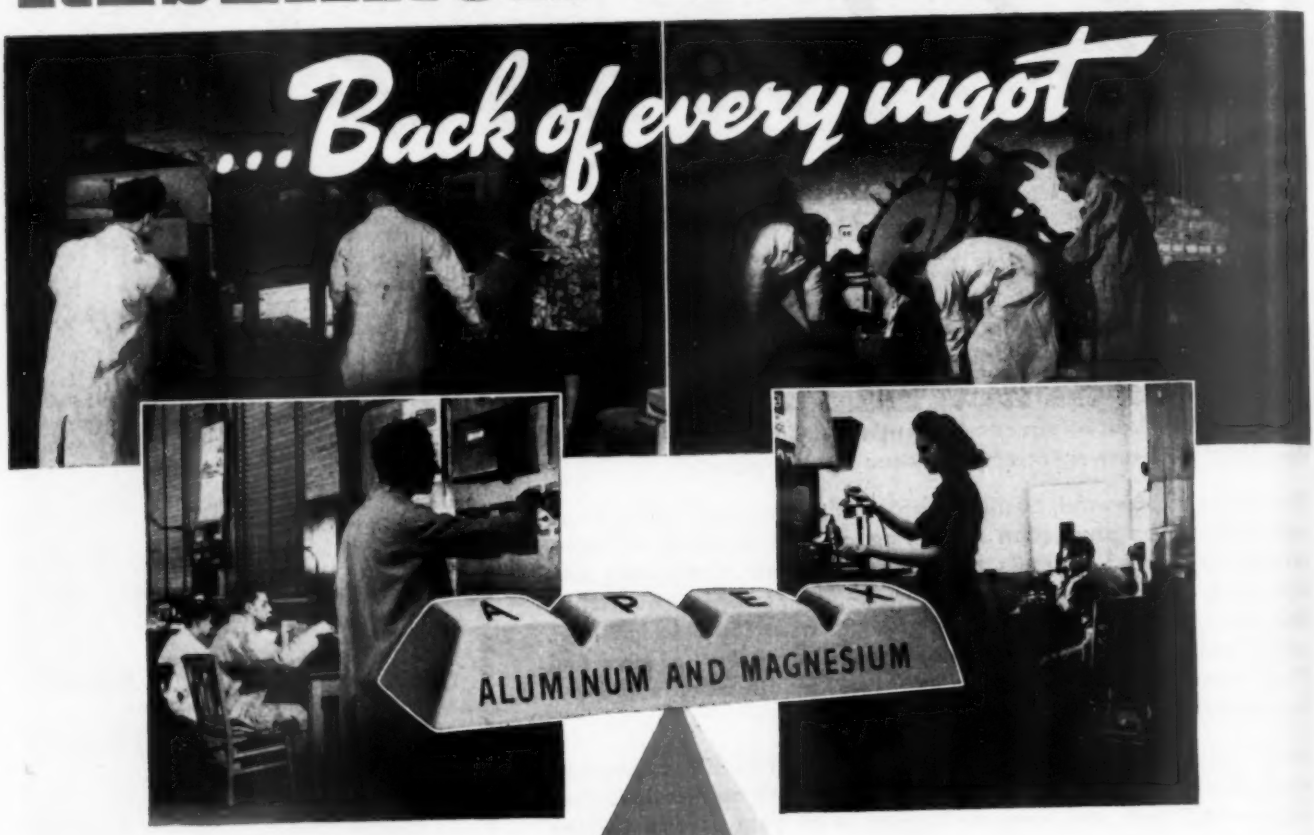
gas inclusion in steel

PICKER 150 KV
MOBILE X-RAY UNIT
Capacity 10 milliamperes at 150 KV continuous

PICKER X-RAY CORPORATION
300 FOURTH AVENUE • NEW YORK 10, N. Y.
ITE MANUFACTURING DIVISION
CLEVELAND • OHIO
PICKER X-RAY OF CANADA, LTD.
MONTREAL • TORONTO

First "E" Award in the X-Ray Industry

RESEARCH LEADERSHIP

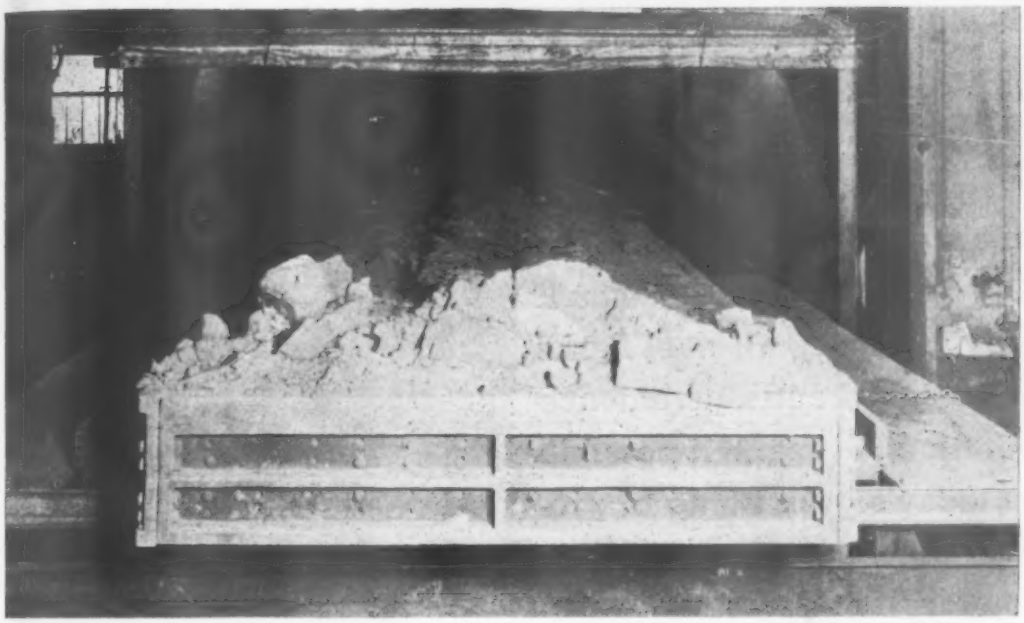


APEX SMELTING

COMPANY

CHICAGO 12, ILLINOIS

Simplicity
QUAD SHAKE-OUTS
Do Giant's Work!



The Simplicity Quad Shake-Out, shown by cut, was installed in August, 1937, and has operated daily under loads up to 130,000 pounds

SIMPLICITY QUAD SHAKE-OUTS are operating today in many foundries producing large castings for war work. One such job is the unit cast tank hull, which with flask and sand weighs around 170,000 pounds. The flask is shaken out and the core sand knocked out of the hull casting in the total elapsed time of only ten minutes.

Quad Shake-Outs have been built in sizes ranging from 10′ x 10′ to 15′ x 22′ in vibrating area. Special deck areas can be supplied for special jobs. The positive blows struck against the flask or casting by the massively constructed vibrating units assure fast and certain movement of the sand, no matter how hard it is baked.

Our engineering representatives will check your job and recommend the proper equipment.

"Purchase Shake-Out Certainty and Assured Service"

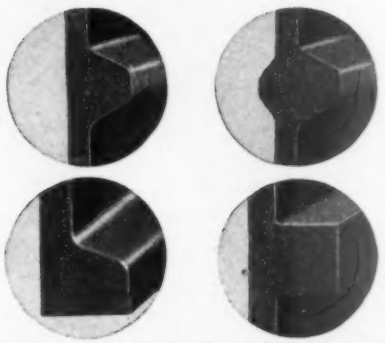
Simplicity Engineering Company

DURAND, MICHIGAN

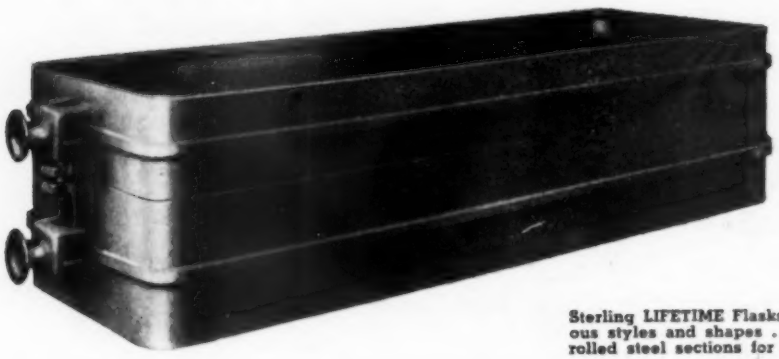
For Canada: Waterous Limited, Brantford, Ontario

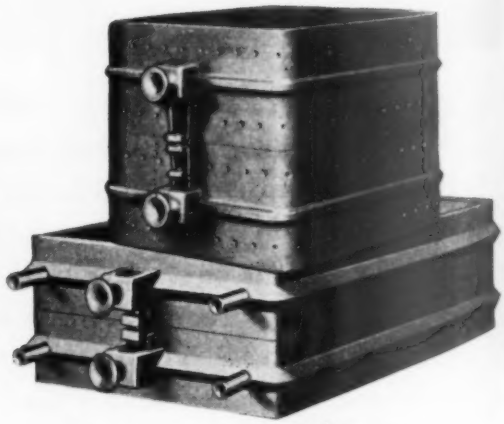
You Always Win with Sterling LIFETIME FLASKS!

Here's a tip on a sure winner! Place your bets on Sterling LIFETIME flasks. You'll find these sturdy, compact, all-steel flasks offer unparalleled speed and convenience in foundry operation . . . make it possible for you to win today's grim battle of production. So take our tip — the next time you require foundry flask service — consult Sterling!



All-welded, integral ribs and flanges; solid center reinforcing rib; square flanges; full width bearing, aids speed and accuracy . . . simplifies ramming and shaking out. (Pat. 1974292)





Sterling LIFETIME Flasks are available in various styles and shapes . . . all-welded, special rolled steel sections for speed and endurance.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY · MILWAUKEE, WIS., U. S. A.

A 4433-1P

Foundry

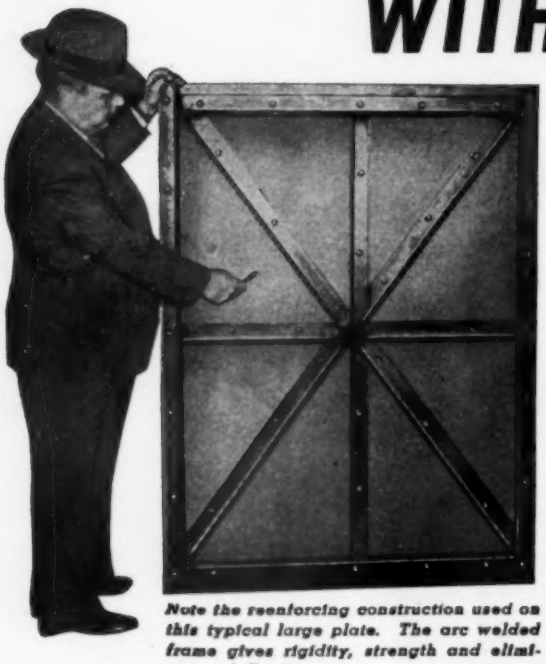
METAL CUTTING MACHINE

Keeping ahead of trends in the processing of magnesium and aluminum castings, DeWalt introduces this specially designed machine for removing gates and risers. Completely new in foundry methods, this DeWalt puts the cleaning room *on a production schedule* and increases the efficiency of the entire foundry. Write for descriptive literature

DE WALT PRODUCTS CORPORATION

LANCASTER, PENNSYLVANIA

CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!



Note the reenforcing construction used on this typical large plate. The arc welded frame gives rigidity, strength and eliminates deflection.

IT IS BEING DONE ON DIAMOND REENFORCED STEEL CORE PLATES

These special core plates are designed to carry large cores up to 1200 lbs., cores of any size, without deflection or warping.

You may obtain Diamond Core Plates to suit your own special requirements. They are furnished with or without perforations and in all smaller, standard sizes—plain or reenforced as indicated by your needs.

Send us detailed information on your core baking problem and we'll be glad to design a plate to handle the job. Weight of core and dimensions, in particular.

DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of **CORE PLATES, JACKETS, BANDS, FLASKS** *since 1889*

A slight change in your methods may mean INCREASED CASTING PRODUCTION

Ask the man who's "Always at Your Elbow"

A wire, phone call or letter will bring to you the services of a Republic Pig Iron Metallurgist. He will make a complete survey of your equipment and methods, and if there is any way to increase your production with your present equipment, he will tell you about it.

He's not a miracle man, but he is a top notch metallurgist who knows pig iron from start to finish. What's equally important, he's a practical foundryman. He knows foundry methods and the one best suited to your equipment, your product and the circumstances involved.

The only obligation incurred in an inspection of your foundry is on his part, and that obligation is to increase your production and decrease your individual casting cost.

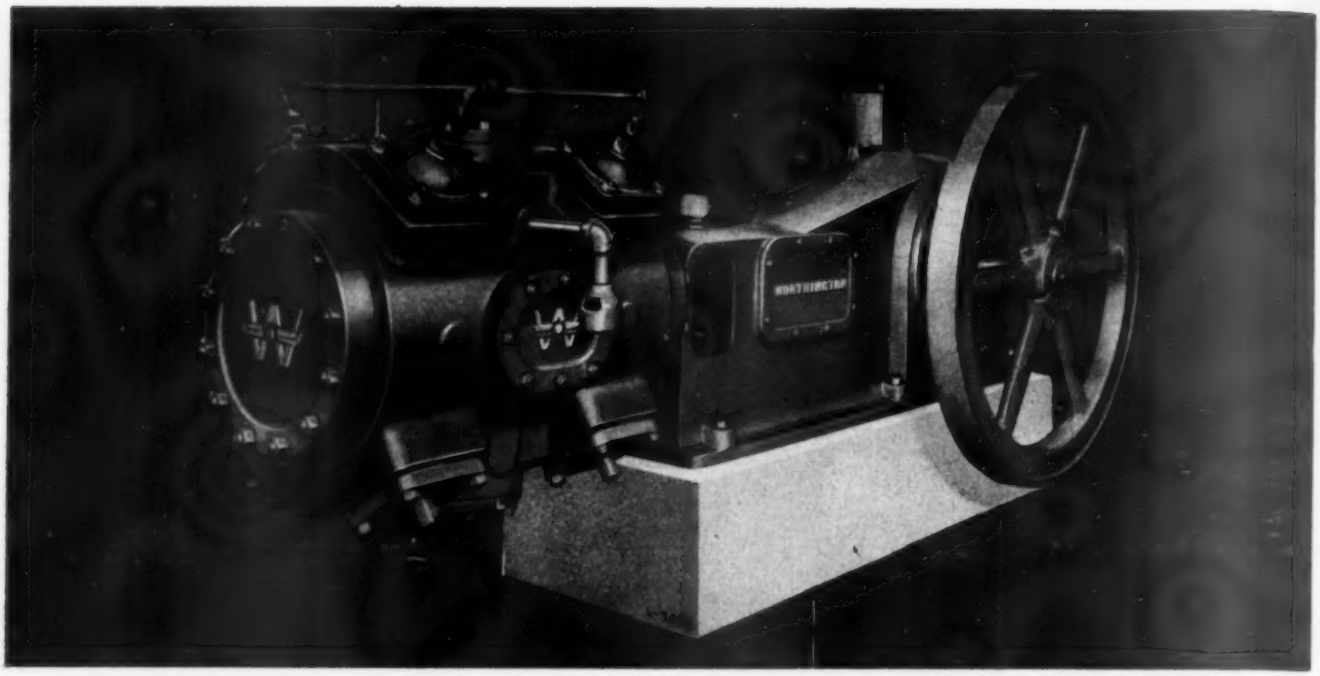
You may or may not be realizing the full working potential of your foundry. Your chance to find out is just as close as your telephone. So reach for it and plan a session with the man who's "Always at Your Elbow."

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York 17, N.Y.

Republic PIG IRON

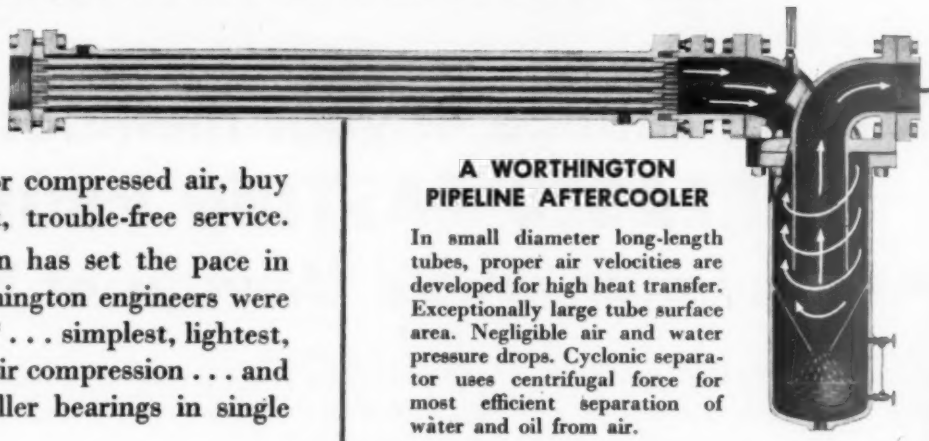
"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS—REPUBLIC CORE WIRE—FOUNDRY NAILS



Compressor BY WORTHINGTON

For Dependable Air at Lowest Cost



A WORTHINGTON PIPELINE AFTERCOOLER

In small diameter long-length tubes, proper air velocities are developed for high heat transfer. Exceptionally large tube surface area. Negligible air and water pressure drops. Cyclonic separator uses centrifugal force for most efficient separation of water and oil from air.

No other compressor will outperform a Worthington

Whatever your need for compressed air, buy Worthington for efficient, trouble-free service.

For years, Worthington has set the pace in compressor design. Worthington engineers were *first* with Feather Valves* . . . simplest, lightest, most effective valves for air compression . . . and *first* with anti-friction roller bearings in single horizontal compressors.

In many cases, in all kinds of manufacturing plants from coast to coast, the type "HB" Worthington Air Compressor shown above has been in operation, without major adjustments, for more than a quarter of a century.

Write for complete data—installation photos—in Bulletin L-640-B1. AC 4-6

* Reg. U. S. Pat. Off.

WORTH BEHIND THE NAME
WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION, HARRISON, N. J., U. S. A.

Bentonite Birthplace

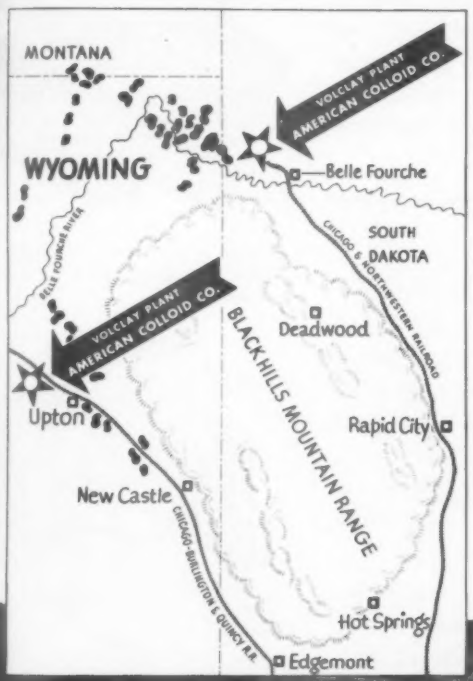
Have you ever stopped to think how bentonite is "born" or "discovered" for use in your industry?

Let us tell you how our company has done it. In 1924, long before any rush for bentonite lands was even contemplated, we began acquiring top-grade acreage. We realized then that the selection of deposits was a science.

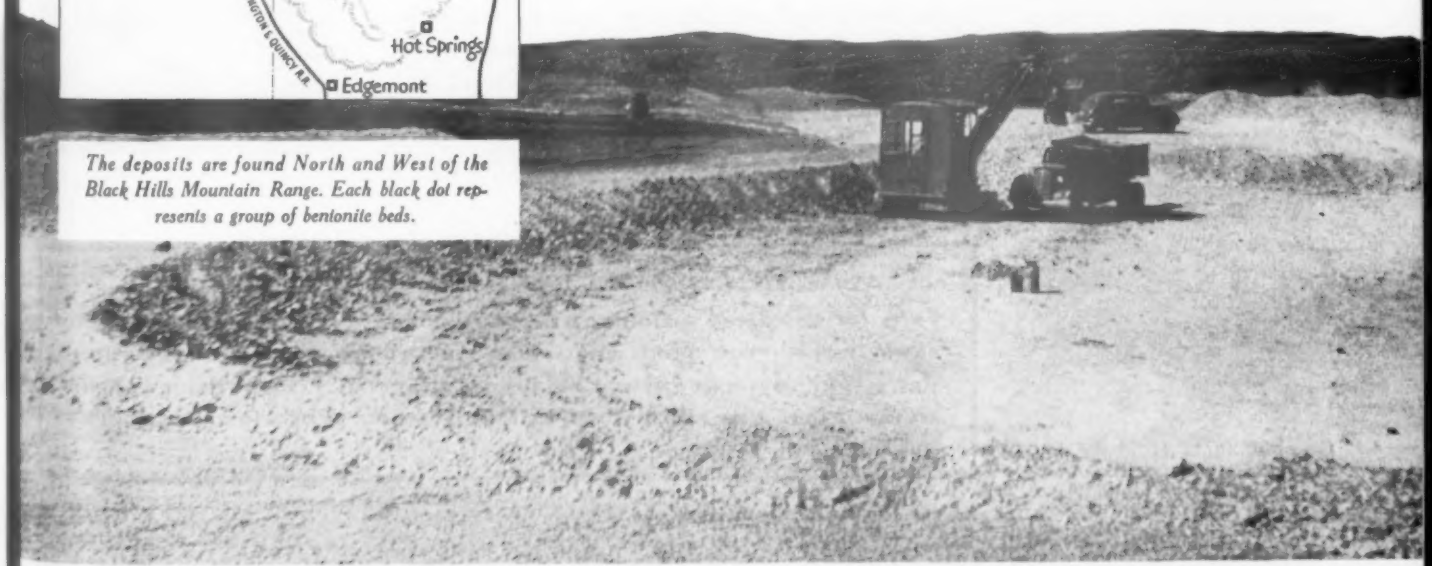
Bentonite is found in stratas from 1½ to 2½ feet thick, not covering large areas solidly, but scattered irregularly over the map and often intermixed with other materials. This meant that meticulous care had to be taken in the selection of the deposits. Drilling crews, directed by the Head of the Geological Department of a large Western University, have combed the region for us gathering thousands of samples for laboratory evaluation.

By arriving in the bentonite fields first, and taking the cream of the crop by careful selection and elimination, we were able to accumulate the largest and finest holdings in the world.

It is this vast, scientifically selected acreage that forms the background for our two processing plants and it insures our customers a constant flow of the highest quality Black Hills bentonite for many years to come.



The deposits are found North and West of the Black Hills Mountain Range. Each black dot represents a group of bentonite beds.



VOLCLAY BENTONITE

Produced by **American Colloid Company** 363 West Superior Street, Chicago, Illinois

Do You { mold, cast, heat-treat, sinter, chill } *Metals?*

Use "NATIONAL" Graphite or Carbon Products

Graphite Mold for the centrifugal casting of alloys and of other materials.

Graphite Spike Mold (two views and cross section) for molding tubes. Tube does not stick; acquires bright finish.

Graphite Ingot Mold for casting non-ferrous metals.

SEVERAL UNUSUAL TYPES of "National" electric-furnace graphite molds and sintering boats, and of carbon heat-treating boxes, are illustrated here. The *combination* of physical properties of synthetic graphite, and of carbon, makes them the ideal materials for practically any application in the handling of molten metals.

The tougher the molding or casting problem, the more likely it is that the application of one of these materials will solve it. For "National" graphite and carbon are highly resistant to extreme thermal shocks, eliminating cracking, spalling and inclusions. At the highest temperatures encountered with molten metals they do not lose their strength, and their negligible thermal expansion assures uniformity of casting dimensions. They are not wet by molten metals so that stripping is easy. They have high (graphite) or low (carbon) heat transfer qualities, as needed. Graphite is an excellent chill-block material.

We invite you to bring your foundry and allied problems to us, and to write for Catalog Section M-8000, National Carbon Company, Inc., Cleveland 1, Ohio, Dept. 37H.

★ *BUY UNITED STATES WAR BONDS* ★

Graphite Sintering Boats and Trays for many types of metal purification.

Carbon Heat-Treating Boxes. Practically any shape or size may be made.

Other important metallurgical applications:

Parts for powdered metallurgy pressure molds • Rods for risers of steel castings • Run-out boards and tables • Resistance and induction furnace liners • Pickling tanks and tank linings • Ladle linings • Trough linings • Mold washes • Core rods • Dies • Brazing trays • Furnace parts • Tubes for chlorine purification of metals.

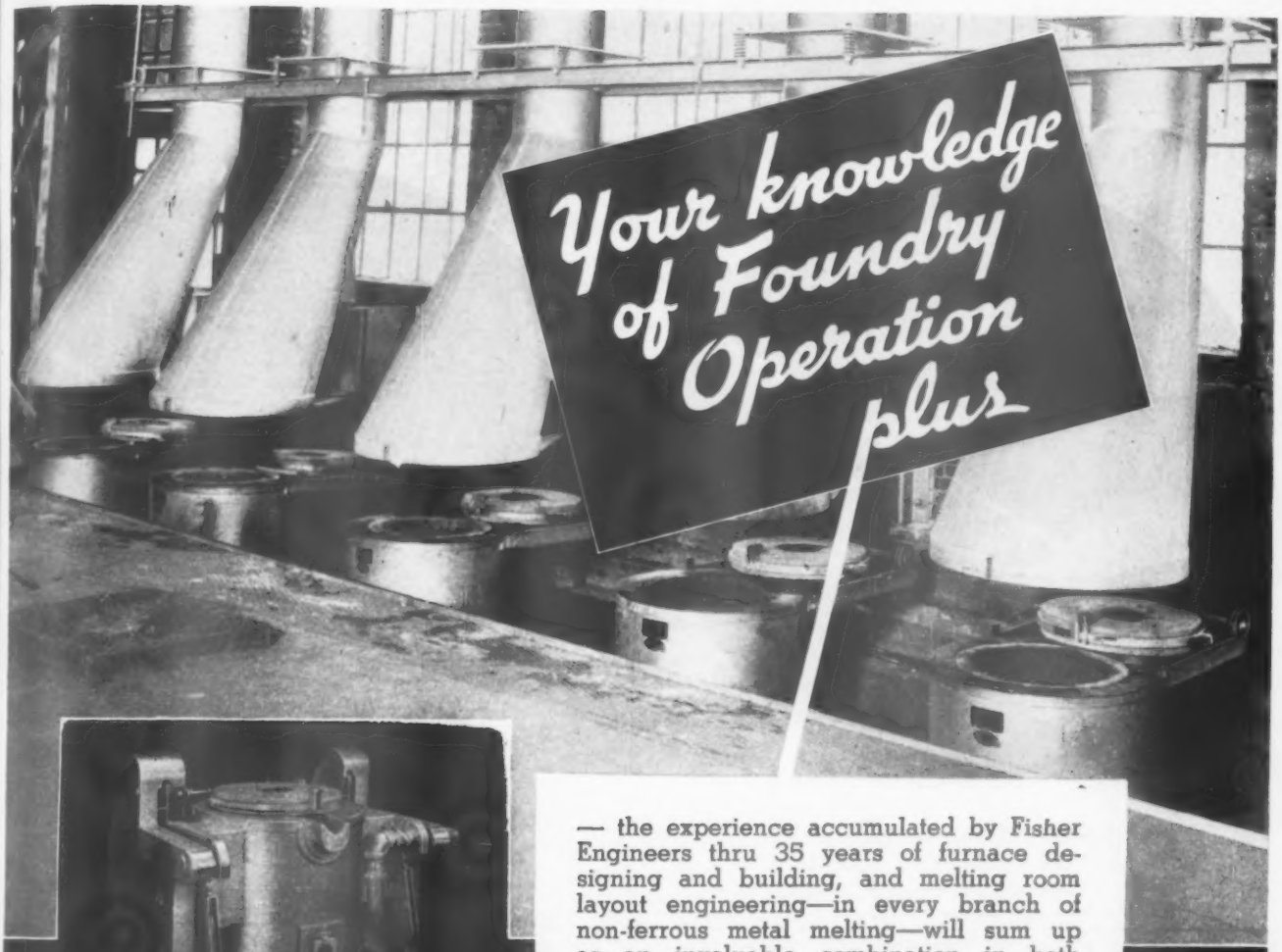
The word "National" is a registered trade-mark of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

General Offices: 30 East 42nd Street, New York 17, N. Y.
Division Sales Offices: New York, Pittsburgh, Chicago, Atlanta, Dallas, Kansas City, San Francisco



— the experience accumulated by Fisher Engineers thru 35 years of furnace designing and building, and melting room layout engineering—in every branch of non-ferrous metal melting—will sum up as an invaluable combination in both modernization and expansion programs. It paves the way to greater operating flexibility and greater profit, thru coordination of equipment to plant and production conditions. Learn about this engineering service, without obligation, and receive illustrated, descriptive engineering data on the complete line of Fisher Crucible Melting Furnaces (stationary—hand wheel operated, tilting types, and motorized units), Iron Pot Melting Furnaces, Centrifugal Blowers, Combination Blowers and Oil Pump Systems, Karmix Cement, Silicon Carbide Linings, etc.

FISHER FURNACE COMPANY
5519 N. Wolcott Ave. Chicago 40, Illinois

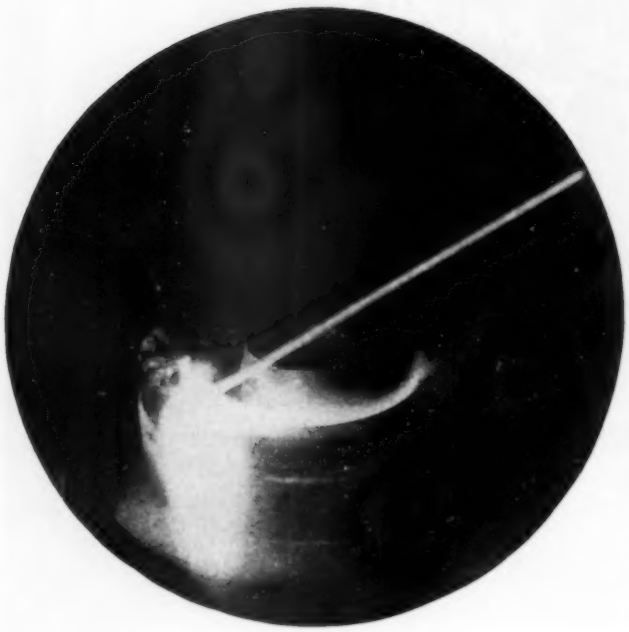
LITERATURE on any of these units sent on request.

FISHER MOTORIZED NOSE POUR CRUCIBLE
Oil or gas fired. No. 150 to No. 400 crucible capacity. (450 to 1200 lbs. in red brass or 150 to 400 lbs. in aluminum).

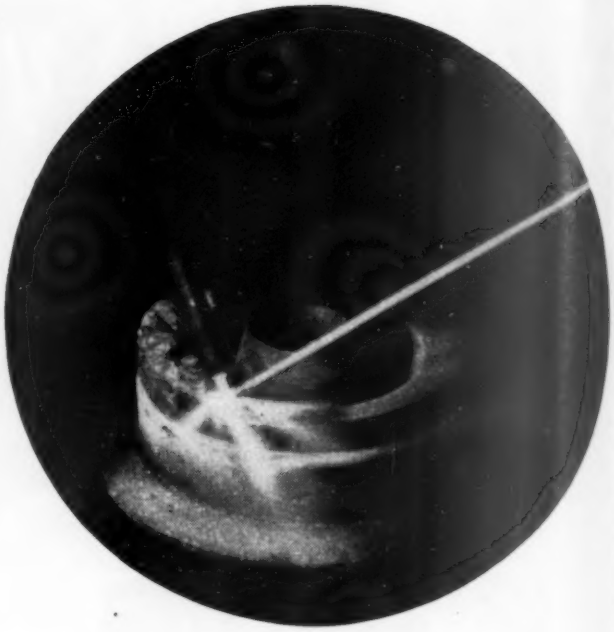
FISHER B.B.I. HAND OPERATED CRUCIBLE
Oil or gas fired. No. 150 to No. 400 crucible capacity. (450 to 1200 lbs. in red brass or 150 to 400 lbs. in aluminum).

FISHER TYPE "S" STATIONARY CRUCIBLE MELTING FURNACE
Oil or gas fired. No. 20 to No. 250 crucible capacity. (60 to 750 lbs. in red brass or 20 to 250 lbs. in aluminum).

FISHER COMBINATION BLOWER AND OIL PUMP UNIT
Oil and air requirements delivered by same motor. Full range in combination sizes.



PHOTOGRAPHED THROUGH NOVIWELD LENS



PHOTOGRAPHED THROUGH NOVIWELD-DIDYMIUM LENS

Which lens shows the rod & bead more clearly?

You can easily see, from these unretouched photographs taken through two different lenses, which lens gives your gas welders a *clearer* picture of their work.

Note how the Noviweld-Didymium lens screens out "sodium flare" . . . how it lets your welders see the rod and bead clearly . . . and gives them a better view of the whole working area. This lens also preserves the orange and red color values so important to welders and burners in judging their work.

Another advantage of Noviweld-Didymium lenses: its clearer vision means faster, more uniform production.

You can get immediate delivery on Noviweld-Didymium lenses in shade numbers 3, 4, 5, and 6. Your nearest AO Branch Office will take your order—and gladly demonstrate just how these lenses can help your welders and burners do top grade work in less time.

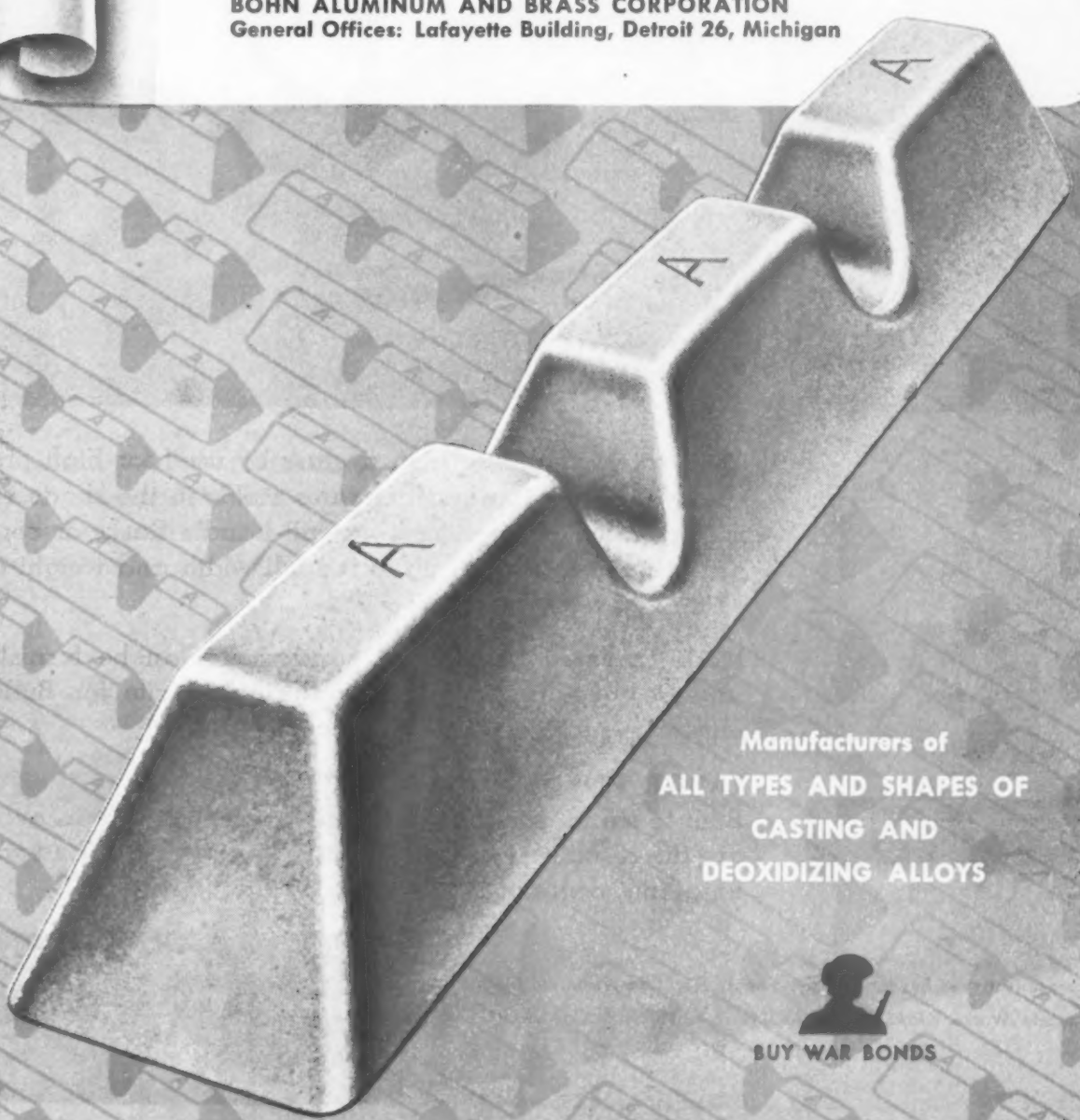
American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

Uniform Castings Begin with Uniform Ingot

Uniform castings mean castings produced at lowest cost, with a minimum of lost motion and spoilage. And uniform castings cannot result, unless you start with uniform ingot. That's exactly the kind you get when you buy from Aluminum Refiners. Over a quarter century of experience enables us to produce ingot to your most exacting specifications—that will cut costs for you and increase profits!

ALUMINUM REFINERS

Division of
BOHN ALUMINUM AND BRASS CORPORATION
General Offices: Lafayette Building, Detroit 26, Michigan

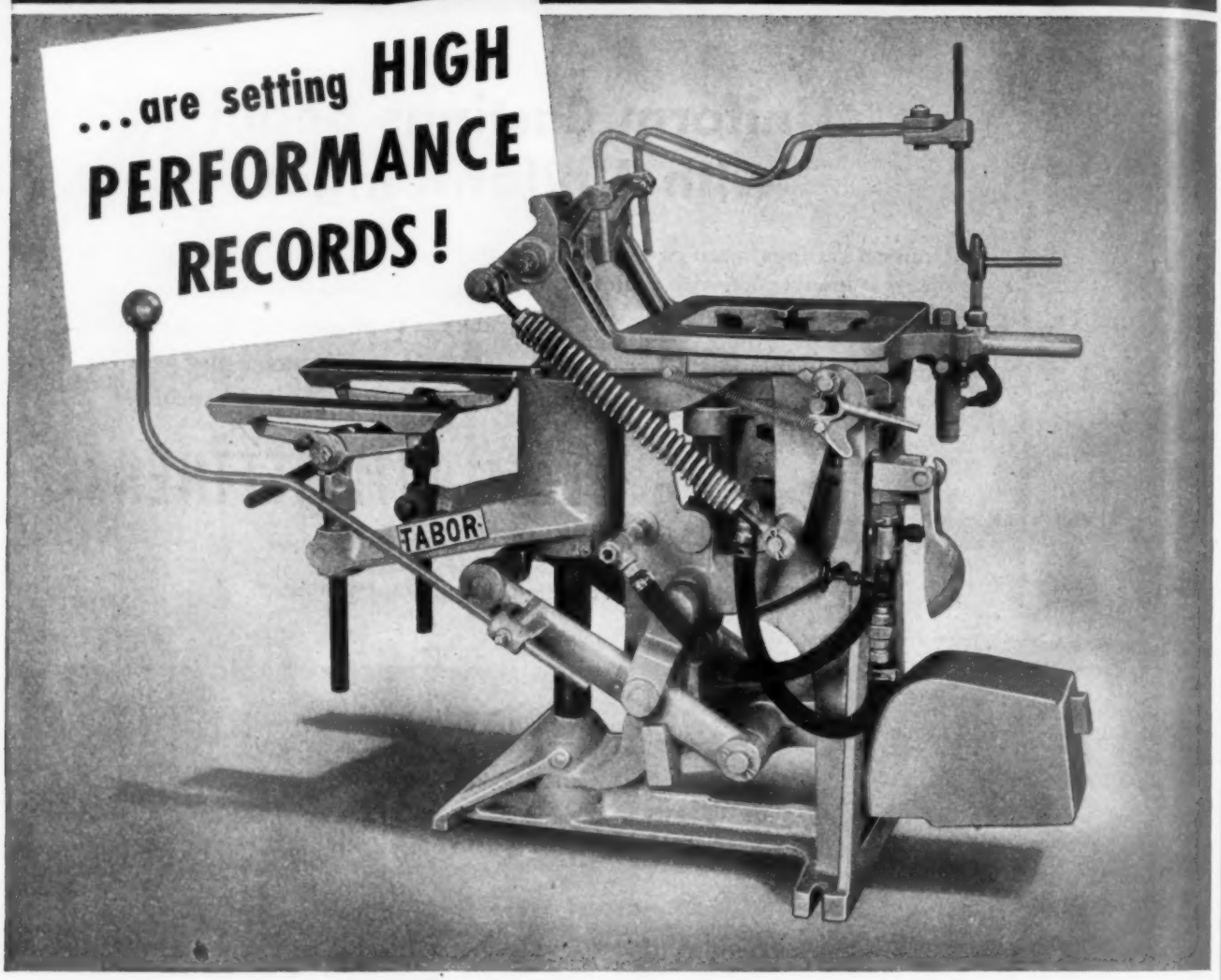


Manufacturers of
ALL TYPES AND SHAPES OF CASTING AND DEOXIDIZING ALLOYS

BUY WAR BONDS

TABOR JAR-RAM, HAND ROLLOVER, HAND-DRAW MACHINES...

...are setting HIGH PERFORMANCE RECORDS!



This type of machine is in a class by itself for high production ability. The jarring member rams molds in the shortest possible time and the rollover member will handle flasks or core boxes, unrestricted in length, up to the full width and weight capacity of the machine.

Made in several sizes and capacities. Can be furnished with squeeze member added when desired. Write for Bulletin 424 illustrating and describing the complete line.

TABOR PNEUMATIC VIBRATORS

Built to stand punishment. Durable and effective in action, they are the result of over a half-century's experience and will return unfailing, continuous service.

Representatives: Snyder Foundry Supply Co., *Los Angeles, Calif.;* Pacific Graphite Works, *Oakland, Calif.;* Carl F. Miller & Co., *Seattle, Wash.*

THE TABOR MANUFACTURING CO.
6225 Tacony Street
Philadelphia 35, Pennsylvania

What's New in Crucible Melting?

MODERN, PRODUCTION-BUILDING IDEAS ADVANCED IN THIS *New Catalog*

Foundrymen, everywhere, will find this new Tercod Crucible Catalog a genuinely worthwhile source of information on up-to-the-minute methods.

How to achieve faster melting...how to lower costs per casting...how to conserve fuel—these and many other important, current problems are discussed and conclusively answered.

Particularly timely is a special section devoted to aluminum melting, and the prevention of iron—contamination of this metal while in the molten stage. Blueprints of furnace construction graphically explain the ease of conversion from iron pots to the modern ceramic crucible.

** Copies of this new catalog will be promptly mailed on request. Fill out the coupon below and mail today.*

Electro REFRACTORIES AND ALLOYS CORP.
VARS BUILDING BUFFALO 2, N. Y.

ELECTRO REFRACTORIES
and Alloys Corp.
Vars Bldg., Buffalo 2, N. Y.

Gentlemen:

Please send your new catalog on Tercod Crucibles, without cost.

Name_____

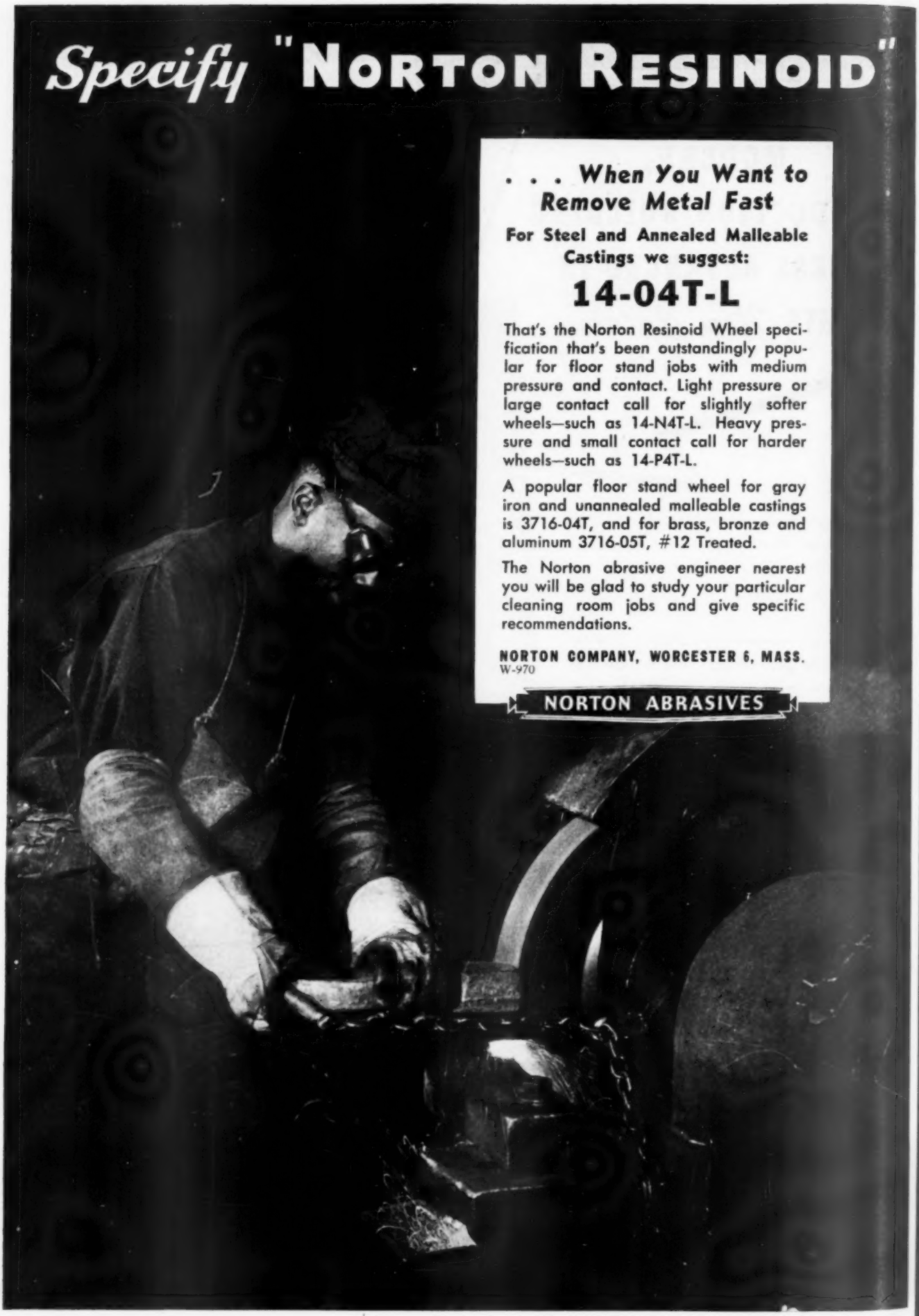
Title_____

Company_____

Address_____

City_____ State_____

Specify "NORTON RESINOID"



. . . When You Want to Remove Metal Fast

For Steel and Annealed Malleable Castings we suggest:

14-04T-L

That's the Norton Resinoid Wheel specification that's been outstandingly popular for floor stand jobs with medium pressure and contact. Light pressure or large contact call for slightly softer wheels—such as 14-N4T-L. Heavy pressure and small contact call for harder wheels—such as 14-P4T-L.

A popular floor stand wheel for gray iron and unannealed malleable castings is 3716-04T, and for brass, bronze and aluminum 3716-05T, #12 Treated.

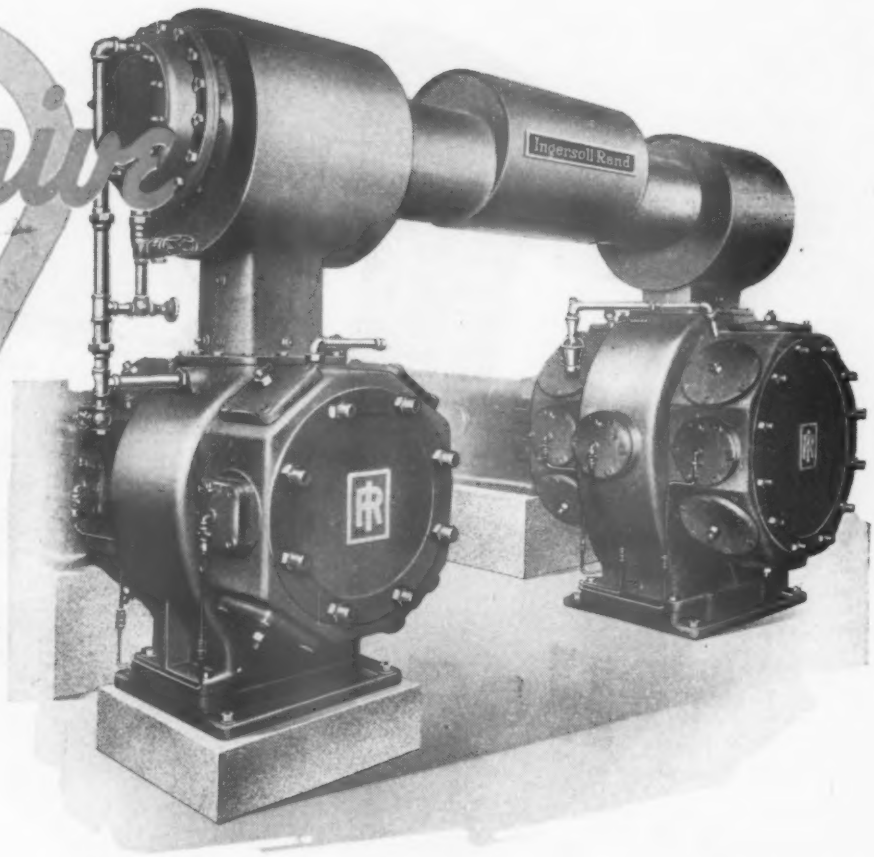
The Norton abrasive engineer nearest you will be glad to study your particular cleaning room jobs and give specific recommendations.

NORTON COMPANY, WORCESTER 6, MASS.
W-970

NORTON ABRASIVES

Which drive?

- ELECTRIC
- STEAM
- OIL
- GAS
- BELT



THERE'S ALWAYS ONE BEST DRIVE FOR YOUR COMPRESSOR

Perhaps it's a direct-connected electric-motor which best fits in your over-all power layout . . . a synchronous motor improves the power factor.

Or it may be steam, especially when the exhaust can be profitably used in process work or heating.

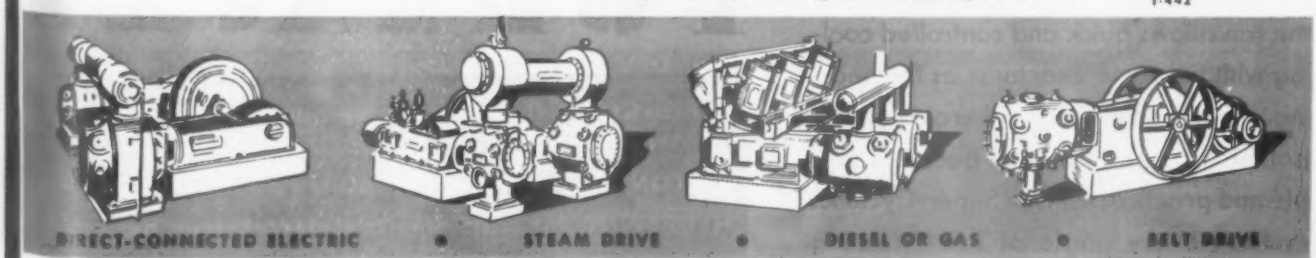
Then there are conditions best met by direct-connected oil- or gas-engine drive. In other cases, belt drive may be the correct solution.

But there is always *one best* choice, and there is no need to guess the answer. Ingersoll-Rand can furnish you compressors with any type of drive, and I-R engineers will be glad to study the problem with you, helping you select the compressor which best suits *your* conditions.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

I-442



heat and cool metals for cycle-annealing

at precise temperatures with *fan driven* air!

Operating with fan driven air under terrific velocity from an isolated heat source, the Lindberg recirculating furnaces are able to do surprising things in the heat-treating field.

Because the heat source is outside the treating chamber, there is no radiant heat to distort outside pieces in the load, temperatures can be pre-arranged and an "automatic program control" set up for both heating and cooling without withdrawing the load from the furnace.

Cutting the heat source and continuing the fan allows quick and controlled cooling with the same exactness as the heating. Cycle-annealing, spheroidizing or isothermal transformation becomes simple and practical with the Super-Cyclone. In fact, every angle of heat treating shows an advantage with this remarkable furnace—it does work faster with a minimum of correction; it saves time, floorspace and manpower; it provides, in the same furnace, normalizing or annealing, hardening, or tempering. Write to Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12.

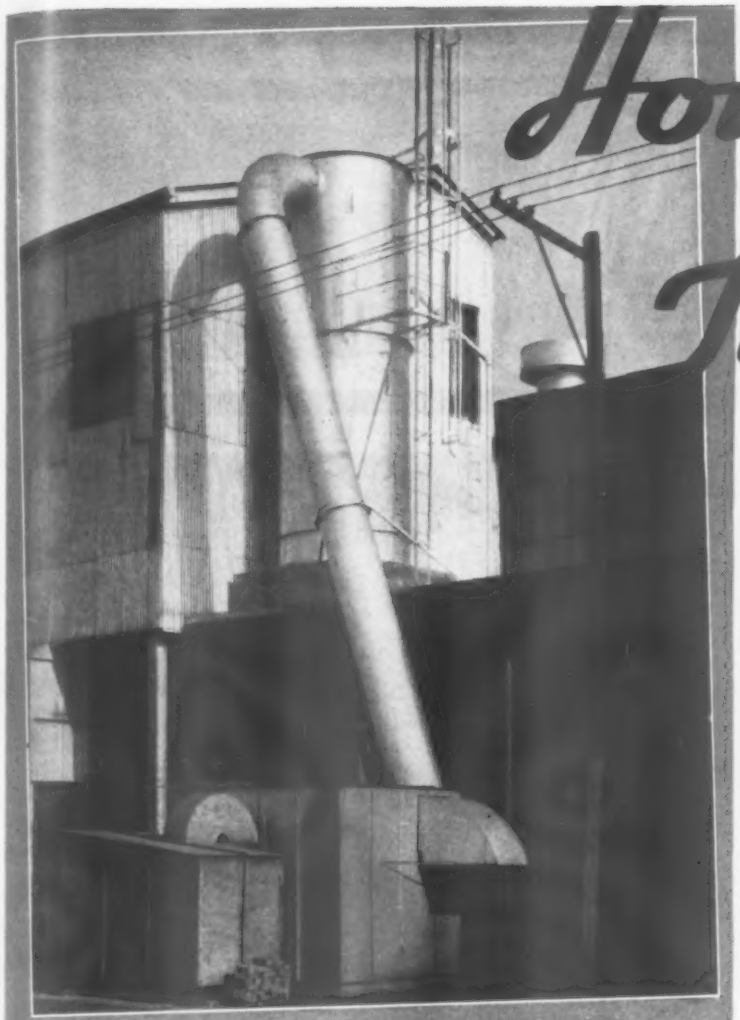
ARMY NAVY

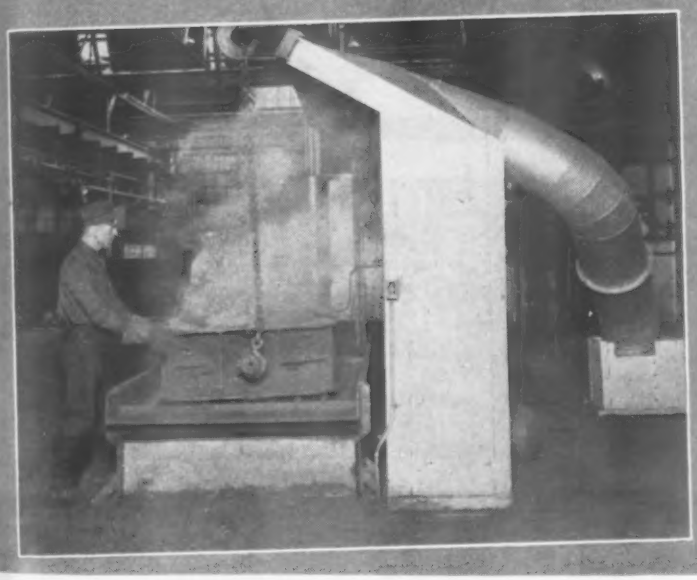
Lindberg FURNACES

SUPER-CYCLONE for hardening, normalizing, annealing, tempering

CYCLONE for accurate, low-cost tempering and nitriding

HYDRYZING for scale-free and decarb-free hardening





The dust and fume curse is lifted from shake-outs by Schneible "Uni-Flo" Hoods, with minimum air volume.

How's Your LABOR Turnover?

In many foundries, contaminated air in the working zones is a basic cause of labor shortages, absenteeism and late deliveries of armament castings.

The war has furnished abundant evidence that only the best method of dust and fume control is good enough for the modern foundry. Workers of the more desirable type take jobs *and stay* in foundries where their health and efficiency are not impaired by dust and fumes. In an ever-growing list of foundries with outstanding production records, the air is thoroughly cleaned and the collected dust and fumes disposed of with Schneible Multi-Wash Equipment.

Clean air at all times is assured by Schneible Equipment which functions faithfully 24 hours a day, year after year. Schneible Multi-Wash Collectors use only water (other liquids, where required) over and over again as the collecting medium. The collected dust, as sludge, is easily disposed of. Practically no attendance is required and maintenance is minimized by the fact that there are no parts to break, burn, clog or rapidly wear. In ultimate cost, Schneible Dust and Fume Control Equipment is the most economical.

Write for informative bulletins.

CLAUDE B. SCHNEIBLE CO.

2827 Twenty-Fifth St., Detroit (16), Michigan.

Engineering Representatives in Principal Cities

SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

RANSOHOFF

automatic Star-return

TUMBLING MILLS

speedy . . gentle . .
stars handled automatically
throughout

QUICKER AND BETTER TUMBLING

and still you

SAVE . . .

30% to 70%

Here's the "How and Why"

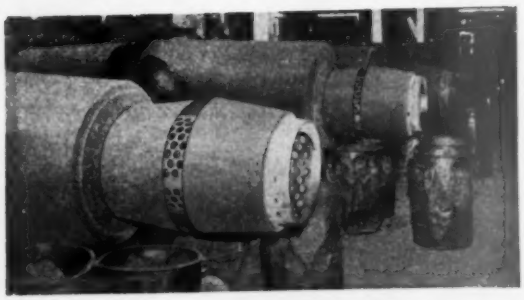
THE RANSOHOFF WET METHOD

Castings cascade in a mass in which stars are intermingled thoroughly. All voids are filled completely. Stars vary in size and shape. This results in very rapid cleaning without nicking, breaking or excessive mill wear. Stars enter and return automatically. Wet method eliminate dust and dust collectors ar reduces health hazards.

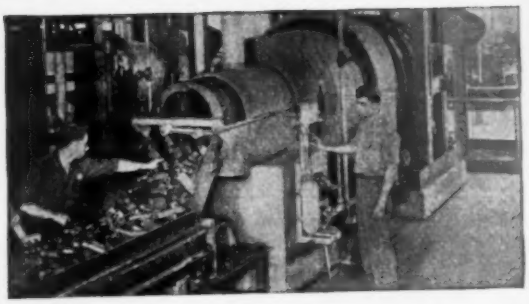
N. RANSOHOFF Inc
Township & Big 4 RR
CINCINNATI, O

Side-loading, side-unloading wet mill. A hot solution is pumped through the mill while tumbling; clear rinse-solution pumped through while stars are returning. Castings discharged on chute to sorting table.

Tumbling piston rings castings after molding and before machining, about 20 minutes per batch. Additional screen for separating polywogs or risers. Same mill used also in production and job foundries.

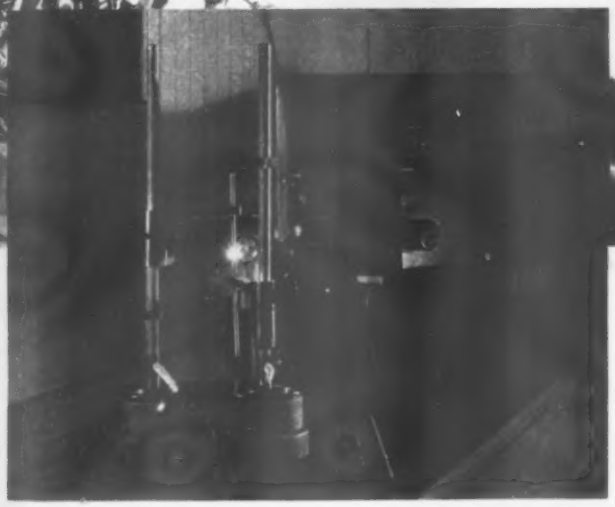


End-loading, end-unloading mill. Castings cleaned twice; before sorting and grinding; after sorting and grinding, ready for plating. Discharges onto inspection conveyor table. Power loader in pit.



End-loading, end-unloading wet mill cleaning grey iron pipe fittings. Discharges directly onto sorting table. Power loaders below floor level for loading.

Side-loading, side-unloading wet mill cleaning brass pump castings. Cold water is pumped through mill. Tumbling material usually brass crucible droppings.



Aluminum and Magnesium, Inc.
Sandusky, Ohio

The American Metal Company, Limited
New York City 6

Apex Smelting Co.
Chicago 12, Illinois

Berg Metals Corporation
Los Angeles 11, California

The Cleveland Electro Metals Co.
Cleveland 13, Ohio

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New York City 5 and Branches

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Perfect control, in the laboratory as at a gun sight, insures maximum performance . . . hastens the day of victory. For without weapons constructed of highest quality metals, the most superior marksmanship may be wasted.

The production of aluminum alloys requires the most exacting laboratory control. Therefore, we have welcomed and adopted each new scientific instrument and method as rapidly as it has been developed. The output of the members of the Aluminum Research Institute has been little short of spectacular, but more important, the quality of their ingot has been maintained consistently.

The close laboratory control that made this superior quality possible will continue to benefit industry on the return to peacetime production. It will be ready to assist in the making of better castings at minimum cost for better civilian products. It will help pave the way for the development of new applications and new uses of aluminum alloys for better living.

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MAGNESIUM METAL

PROMPT ATTENTION GIVEN ALL ORDERS

FREMONT FLASKS have established a reputation for efficiency and long wear and in most progressive foundries have replaced the old type, cumbersome, heavy weight equipment.

The FREMONT FLASK with the 1" GROOVLOCK PIN is especially adapted to snap work but can also be furnished with cast ears to accommodate other pins.

Slip Flasks **FREMONT** *Jackets*

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ROURA DUMP HOPPERS

DO THE JOB EASIER, QUICKER, CHEAPER

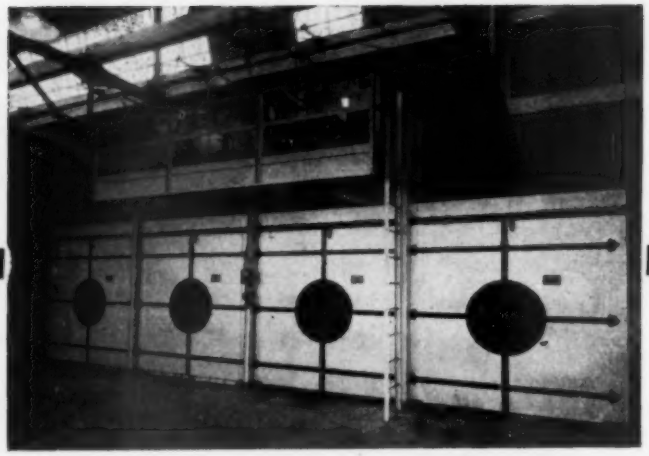
- If you are looking for a way to shave dollars off your handling and shop distribution costs—right here is your answer.
- The Roura, automatic action, dump hopper is not an untried, fancy gadget—hundreds of them have had tough everyday use in many of the country's best managed plants over the last fifteen years.
- Roura hoppers will simplify and speed up your parts handling, saving both time and money.
- They're designed to fit any standard type lift truck and can be built to handle any kind of material, hot or cold, wet or dry.
- Automatic dumping feature saves tons of heavy lifting and carrying.
- Roura hoppers are sturdy, compact and absolutely safe—built for a long life of everyday service, nothing to get out of order.
- If you are interested in cutting your parts or materials handling costs just send us a letter or a card—We will be glad to send recommendations and prices to fit your needs.

SPECIFICATIONS

- Dimensions: 66" long, 34" wide, 46" high. Capacity: one yard. Hopper built of 3/16" steel plate reinforced with 2 x 2 x 3/16" angle. Electric welded throughout. Stand is built of 1/2" material, sturdily welded and has 12" x 28" opening for lift trucks. Total Weight 700 pounds.

Get the full benefit from your tier lift trucks with Roura self-dumping hoppers

ROURA IRON WORKS 1405 WOODLAND AVENUE DETROIT, MICHIGAN



One of several batteries of Carl-Mayer Oil Fired Recirculating Air Heater Type Core Ovens at American Magnesium Division of Aluminum Co. of America.

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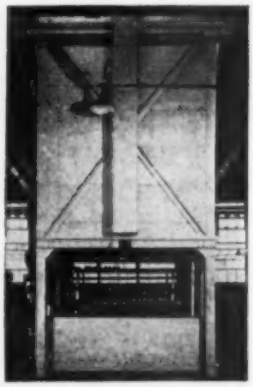
CREATIVE ENGINEERING

Carl Mayer achievements in core baking and mold drying have received the best recognition of all—repeat order after repeat order from America's leading foundries—in face of wide competition. Investigate! You, too, will find it a wise move to consult Carl Mayer when in the market for new or additional core and mold oven equipment. Write for Bulletin 141.



THE CARL MAYER CORP.
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•

Carl Mayer Engineers will Design the Ovens for you

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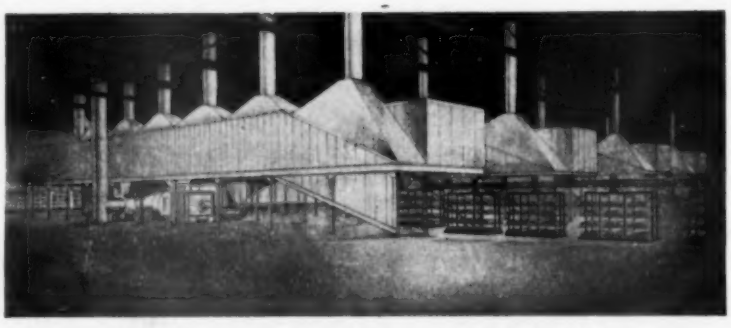
Left—Typical Large Carl-Mayer Vertical Oven as installed for Electric Autolite, Fremont Foundry, Cadillac, General Motors and Packard Motor Co.



4 of the largest Continuous Monorail Core Ovens in U.S.A. for Ford Motor Co. each 170' long.

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CORE AND MOLD OVENS
All types All sizes

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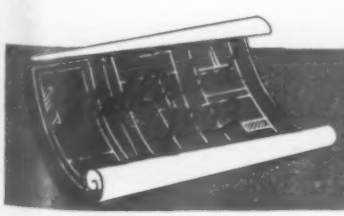

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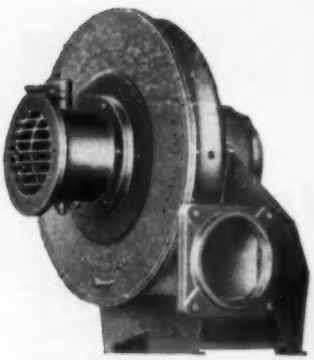
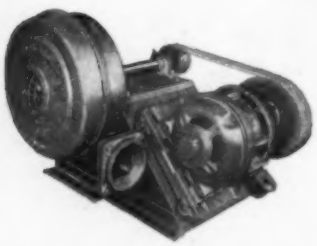
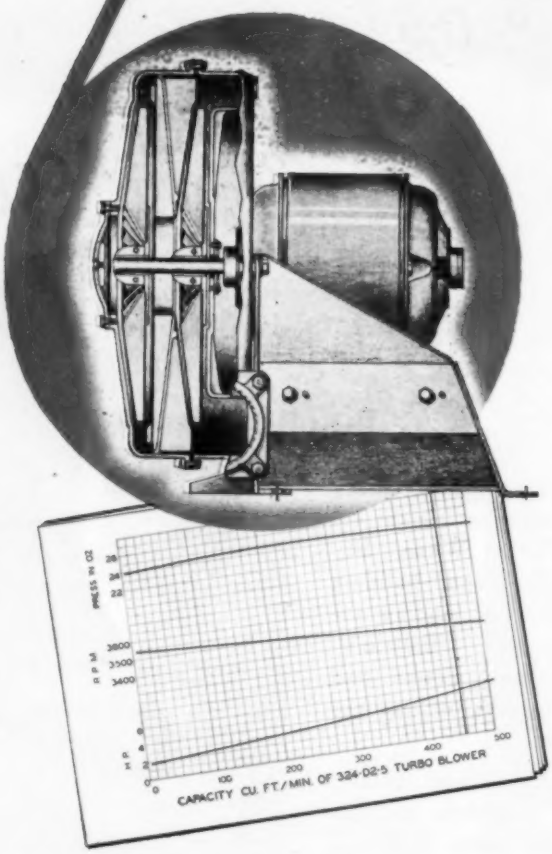
TURBO BLOWERS



(ABOVE) DIRECTLY CONNECTED. Butterfly valve on intake is standard equipment on larger sizes only. Smaller sizes equipped with intake guard—see section at right.

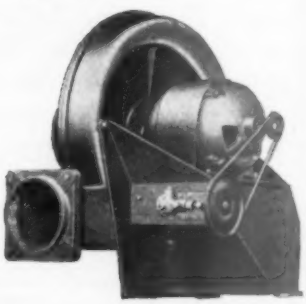
(BELOW) V-BELT DRIVEN. Used where 60 cycle A. C. current is not available.





(ABOVE) DIRECTLY COUPLED facilitates motor change. Blowers available in single or multiple stage—pressures from 8 to 32 oz. and volumes from 60 to 4300 cfm.

(BELOW) OIL PUMP ATTACHMENT for plants requiring small oil systems.



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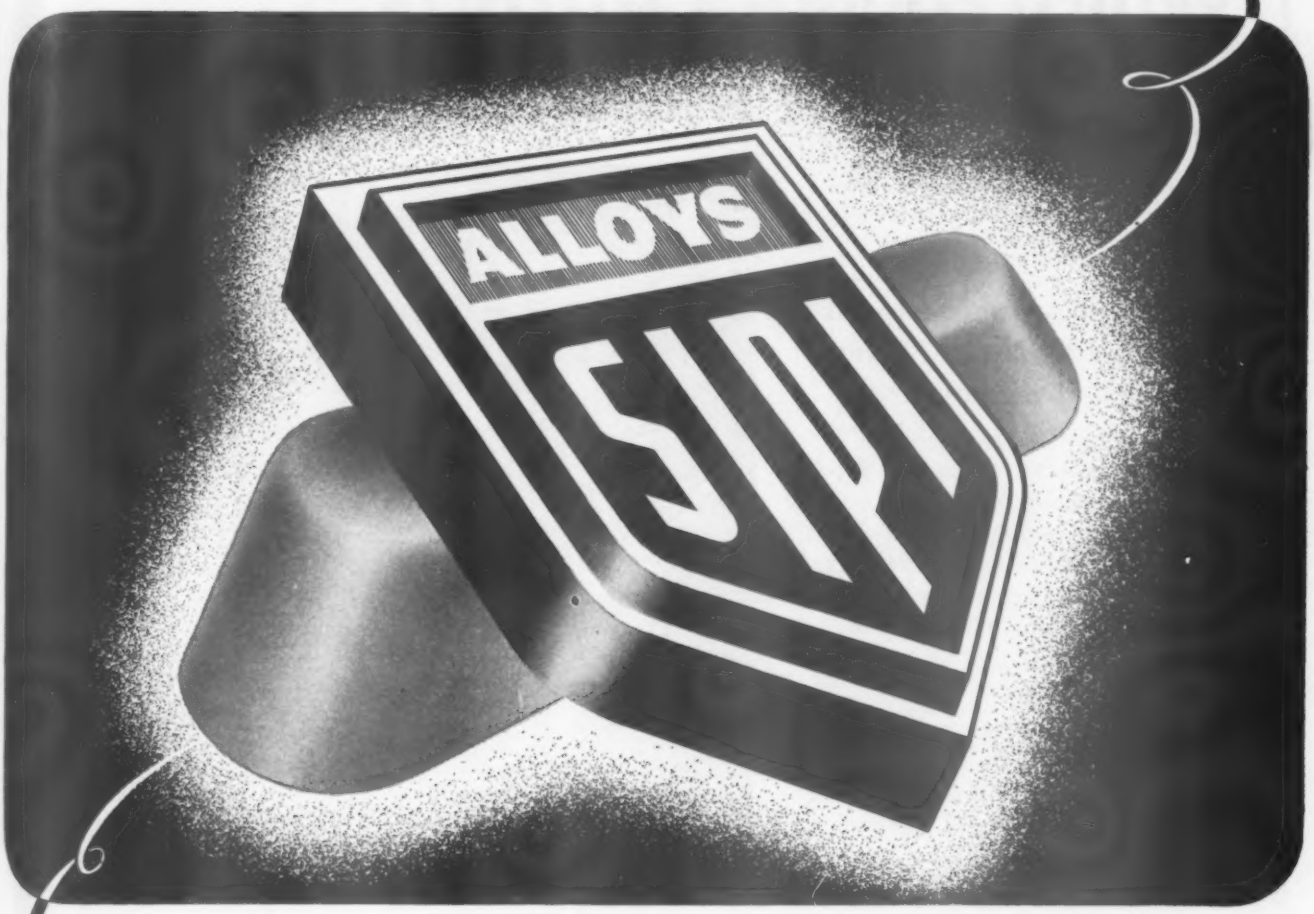

BRONZE INGOTS... from this institution are always uniform in quality—for excellent reasons. They are backed by years of experience and a tradition that permits no compromise with quality. SIPI is more than a trade mark. It is a symbol in alloys—as reliable a name as sterling on silver. The SIPI shield on an ingot is your guarantee that it meets the exacting specifications of industry and that it is the result of tireless research by skilled laboratory and plant technicians.

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Which Foundry Attracts the Best Men?

This sturdy EP-6 Truck operates around the clock—travels many miles and handles nearly 200 tons of foundry loads daily.

Typical Big-Volume Loads Handled by Elwell-Parkers in this Busy Foundry:

Molding Sand—many grades • Core Sand • Miscellaneous Supplies—in barrels and bags • Cores in multiple racks • Flasks — 6 times the manual load at each trip • Castings in quantity • Sprue to charging floor • Foundry Slag to dump.

HERE is a typical big-city Foundry, pouring grey and semi-steel castings. Buildings are one and two stories high, with operations connected by elevators, tunnels and ramps.

Reliable help is hard to get, of course; production is crowded every minute—but a fleet of Elwell-Parker Trucks keeps loads speeding at minimum cost and helps to make this Foundry a good place to work.

Elwell-Parkers can help to make *your* Foundry a better place to work, by liberating men from the need to push and tote your heavy, killing loads by hand. At the same time Elwell-Parker Trucks can help to reduce your costs by transporting far bigger loads per trip—many times faster than men can walk—*with complete safety.*

Whatever metals you pour, the E-P Man can help you to set rock-bottom costs by organizing an Elwell-Parker System to handle all of your loads. He knows foundry operations from sand to slag—is fortified with more than 30 years' successful experience applying Trucks to Foundries producing Grey, Semi-steel, Steel, Magnesium, Aluminum and Brass castings in volume.

Appoint the E-P Man your Transportation Advisor in an all-out program to bring your load-handling costs away *down,* while bringing your employees' safety away *up.*

The Elwell-Parker Electric Company, 4220 St. Clair Avenue, Cleveland 14, O.

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Ft. Worth	4-6184
Greenville	534
Indianapolis	LI 3131
Jacksonville	5-1384
Kansas City	VA 7021
Los Angeles	PR 5911
Memphis	8-1648
Milwaukee	MA 7817
Minneapolis	GE 3247
Montreal	HA 7191
New York	COR 7-0797
New Orleans	MA 6316-C
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YOUR increased wartime needs for High Carbon Ferro-Chrome presented a severe and critical situation. Fortunately, the new production facilities established by Ohio Ferro before Pearl Harbor added an important tonnage, effective in July, 1941. Even though available ore quality and other restrictions caused limitations, Ohio Ferro's production aided many emergencies. In 1942 these facilities were responsible for 24% of the total High Carbon Ferro-Chrome produced. And today Ohio Ferro is ready as always, to meet your High Carbon Ferro-Chrome requirements — with service and the straight-line "production man's" thinking on all of your ferro-alloy problems.

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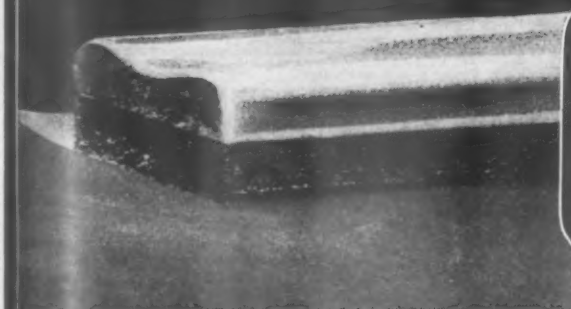

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Easy Cleaner Core Compound

This is a well balanced bond for supplying dry strength and moisture resisting properties to chunky type cores and dry sand molds for heavy castings in both steel and iron foundries.

Easy Cleaner Core Compound is designed to do a good job on black sand cores and dry sand molds.

Easy Cleaner Core Compound has these advantages

- Cleans easily from core box
- Bakes in less time
- Gives greater surface hardness
- Gives good sharp corners
- Cleans out easily

Easy Cleaner Core Compound produces these castings

- Heavy machinery
- Heavy steel
- Columns
- Hollow iron rolls
- Large pipe fittings

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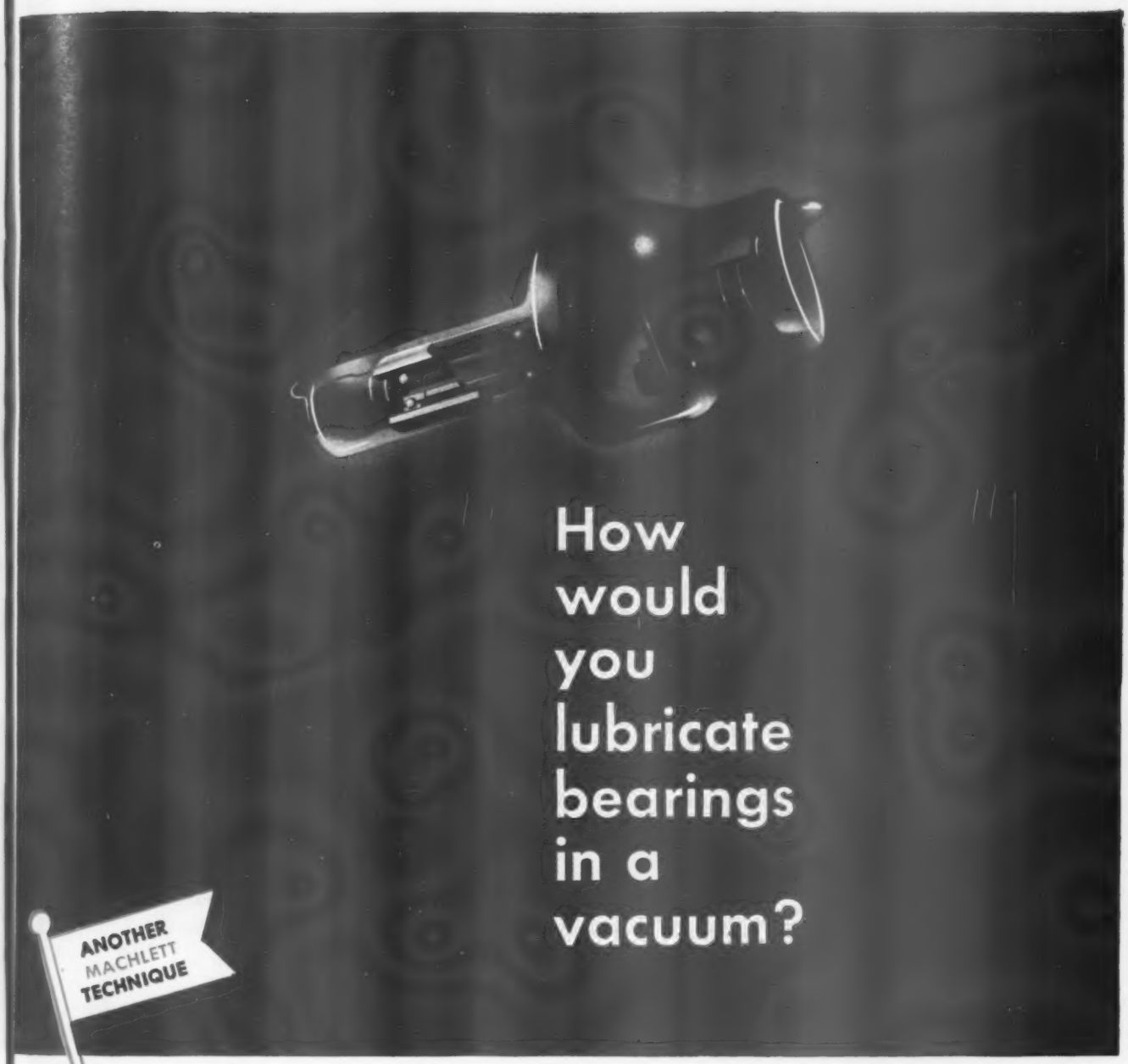

This is a cross-section of the Machlett Dynamax X-ray tube. The ball bearings support the anode, which rotates at 3000 r.p.m., and reaches a temperature of 1000° F. The entire structure is in a vacuum of about 10^{-6} mm. of mercury, or a billionth of an atmosphere.

Conventional lubricants cannot be used, because they would destroy the vacuum and the tube. Machlett's scientific studies showed that a very thin film of certain metals can act as lubricant. Pure silver was found most advantageous. An almost molecular-thin film of it is deposited upon the balls in a vacuum, by a unique method.

So successful was this technique that Machlett, five years ago, guaranteed its Dynamax rotating anode tube for 10,000 exposures. Today it outlasts conventional stationary anode tubes. Some amazing records have been made with it, the best to date being 272,610 exposures, at the Army Examining and Induction Station, Pittsburgh, Pa.

This tube has a focal spot so small as to produce exceedingly sharp pictures, and an X-ray beam so intense as to make possible exposures as short as 1/60th sec. It was the solution of the lubrication problem that added reliability to these advantages. Machlett employs many other advanced techniques in the manufacture of its various types of high-vacuum tubes for medical, scientific and industrial purposes . . . Machlett Laboratories, Inc., Springdale, Connecticut.

This is the Machlett Dynamax Rotating Anode tube, 100 kilovolts, 50 kilowatts, as supplied in an oil-filled, shockproof housing with air circulator and vapor-proof cable terminals.

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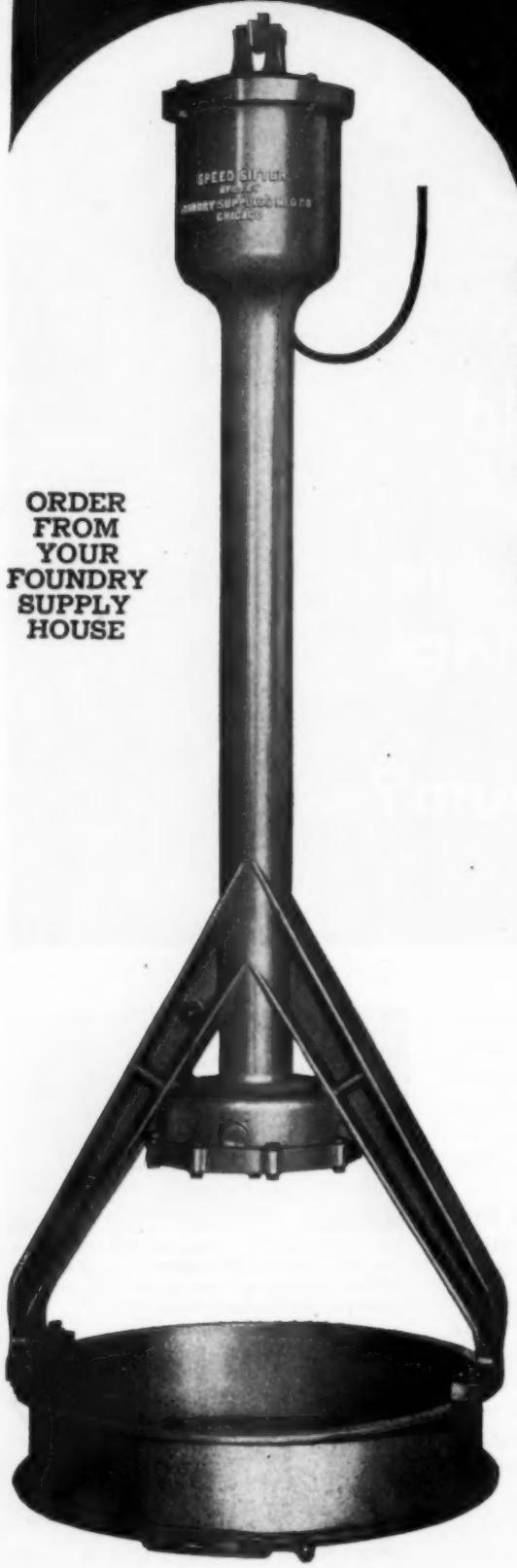
X RAY TUBES SINCE 1898

TODAY THEIR LARGEST MAKER

Increase Production with
ROTOPLANE Speed Sifters

"Hard-to-Please" Foundries Standardize on Rotoplane!



ORDER FROM YOUR FOUNDRY SUPPLY HOUSE

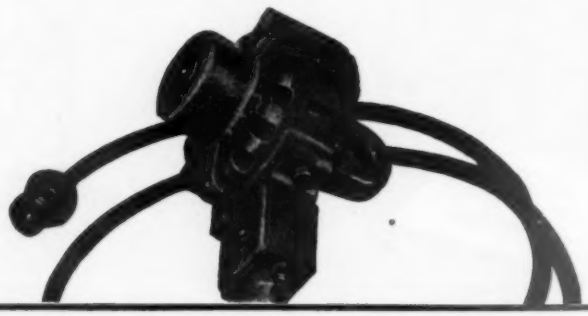
Try ROTOPLANE in your plant. You, too, will find it increases production, does *all* your sifting more quickly and economically. One size and type for all sifting jobs.

ROTOPLANE is built for long, dependable service. Strong, one-piece frame gives remarkably effective vibration. Smooth, free, rotary action. All mechanism completely enclosed and dustproof. Weight approx. 90 lbs., 62 in. high overall.

Steel-mounted sieves instantly interchangeable. No jagged screen edges, no storage problem. 20 in. diameter clear sifting area.

TEN DAYS FREE TRIAL.

$175.00 f.o.b. Chicago—complete with cable, safety ground wire, one sieve (2-4 mesh). Standard ⅓ h.p. motor, 115-230 volts 60 cycle single phase.
Prices with other motors quoted on request.



ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$10.00	No. 5—Heavy match plate, tub, bench	$17.00
No. 2—Medium match plate	13.00	No. 9—Machine and heavier	24.00

FOUNDRY SUPPLIES MANUFACTURING CO.

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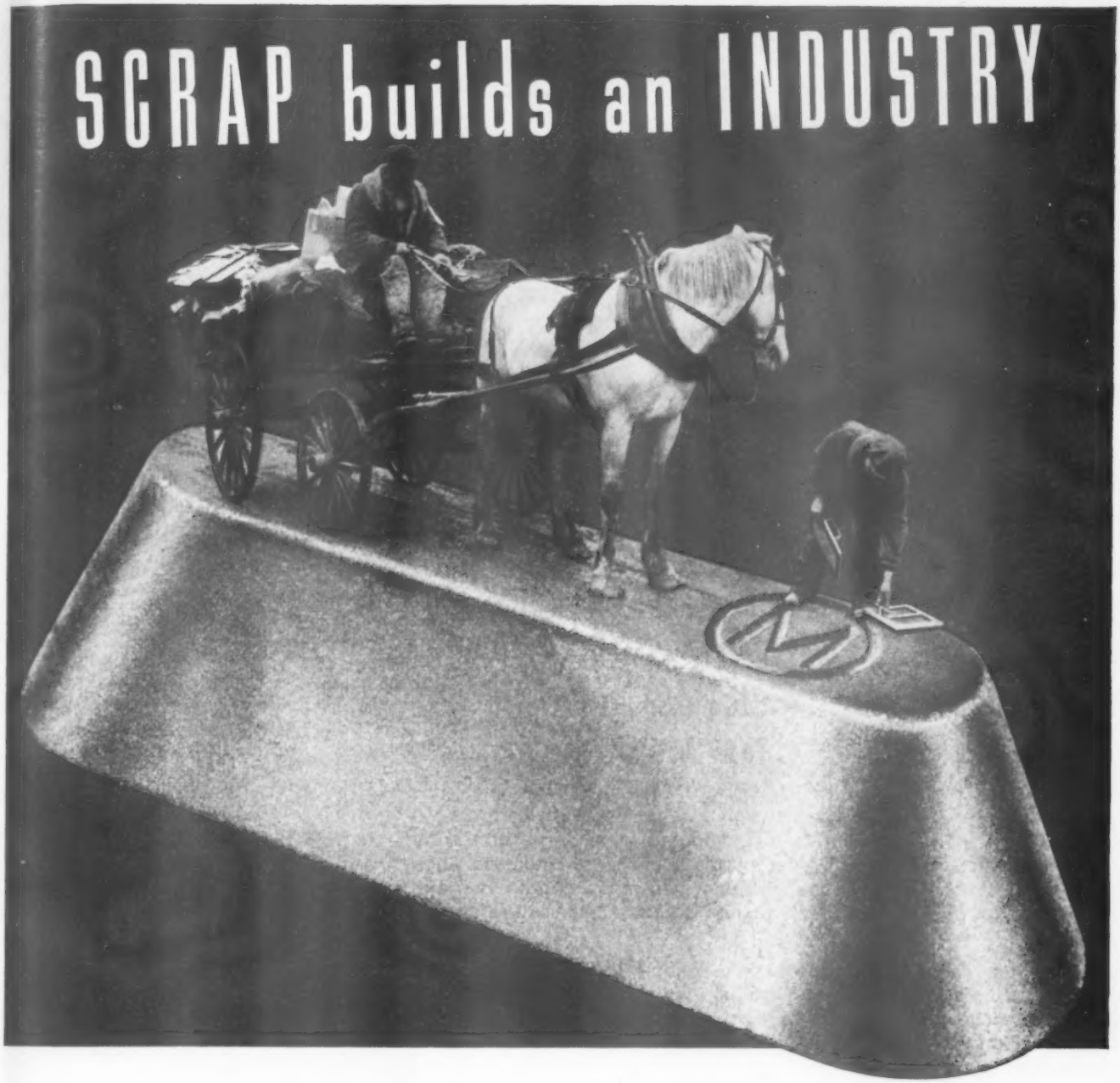
SCRAP builds an INDUSTRY



RIGID selection and segregation of the many varieties of non-ferrous scrap that come into the plants of Michigan Smelting, is the first step in a process that results in the making of accurate analysis, non-ferrous alloy ingot.

If you are a user of non-ferrous alloys, the 50 years experience of this organization, should be of interest to you as a guarantee of the quality of the product we supply. New and informative booklet—sent on request.

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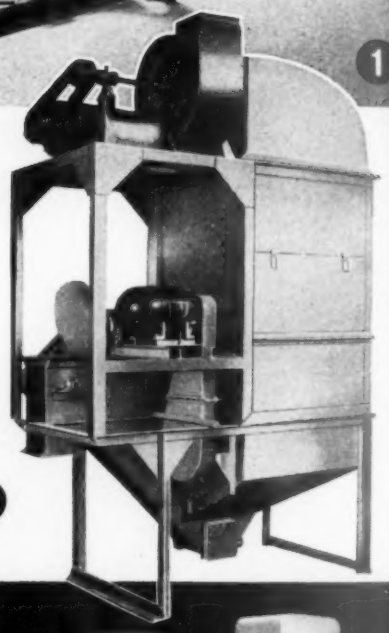
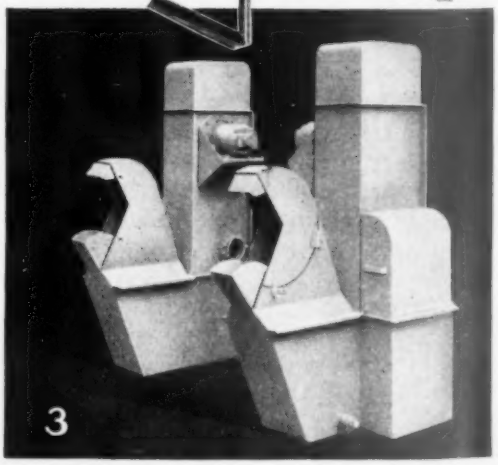
Hydro-Whirl..the Efficient Method of DUST CONTROL

In foundries, grinding and polishing departments . . . wherever Dust is a menace to health and production . . . the modern Hydro-Whirl method of dust control can be depended upon to serve efficiently and economically. Whether your problem concerns the installation of a single unit or involves the planning, designing, engineering and building of a complete system, we invite you to discuss the subject with us.

The engineers of Peters-Dalton have developed dust collectors of all sizes from the small individual, portable unit of 700 C.F.M. to the huge central systems of 100,000 C.F.M. Shown are typical installations of Peters-Dalton equipment, each designed to meet a specific dust collecting problem.





1 Department of twenty double spindle grinding and polishing lathes connected to a Peters-Dalton installation. The 28,000 C.F.M. Hydro-Whirl unit may be seen in right background.

2 Rotor type Hydro-Whirl of 4,000 C.F.M. used for core sand handling.

3 Compact, self-contained, portable 700 C.F.M. Hydro-Whirl; easily moved anywhere. Available left or right hand, as shown.

4 Battery of Hydro-Whirl Magnesium Grinding Booths—part of an installation of 200 units—built for large magnesium fabricating manufacturer.

HYDRO-WHIRL

PETERS-DALTON *Incorporated*

625 EAST FOREST AVE. • DETROIT 1, MICH.

(Formerly Industrial Sheet Metal Works)

MFRS. HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS—INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATING SYSTEMS

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THE BRIQUETS with a 12-year service record

For 12 years, progressive foundrymen have used EM briquets for cupola additions of silicon, manganese, and chromium. They have used this accurate and convenient method for adding alloys because EM briquets permit high recovery of the alloying elements; silicon can be recovered up to 90 per cent; manganese up to 85 per cent; and chromium up to 95 per cent.

The reason for this high recovery is the special binder *which will not burn* in passage through the cupola. Thus the alloy is protected all the way to the melting zone, and oxidation losses are kept at a minimum. Write for the booklet, "Briquetted Alloys for the Cast Iron Foundry."

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ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

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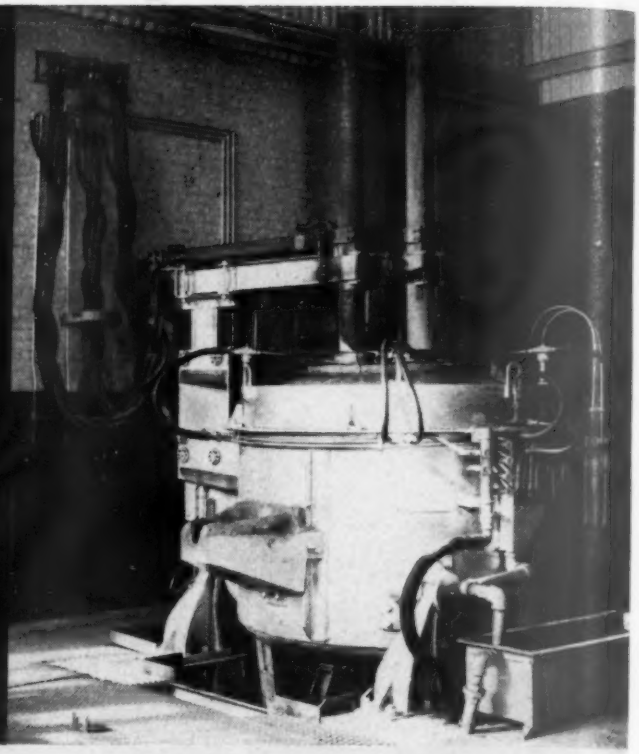
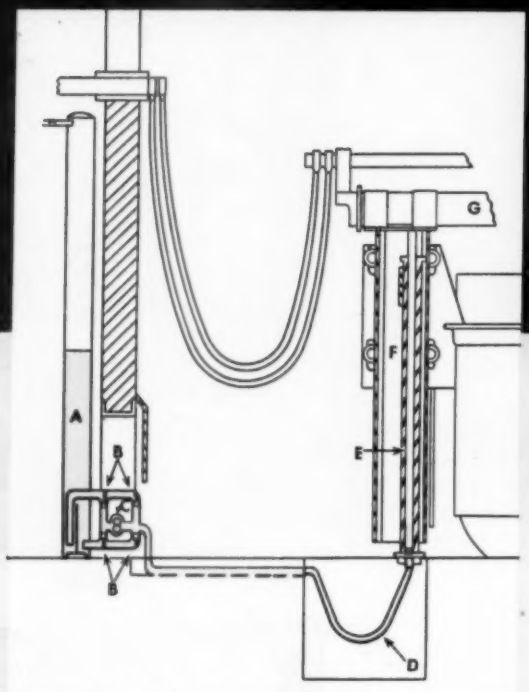
Have You Considered ELECTRIC MELTING?



Photograph shows a typical Hydro-Arc installation. Full details are shown in new Bulletin No. FY-130. Write for a copy.



Diagrammatic view of the Hydro-Arc hydraulic system for positioning electrodes, showing: A—closed oil and air tank; B—valves; C—reversing pump; D—flexible connection; E—hydraulic operator cylinder; F—vertical extension; G—electrode arm.

Weight of the electrode arm is counterbalanced by air pressure in upper part of tank A.

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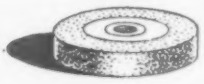
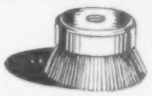
or this  or this 

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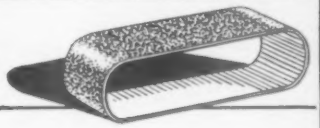
this or this 

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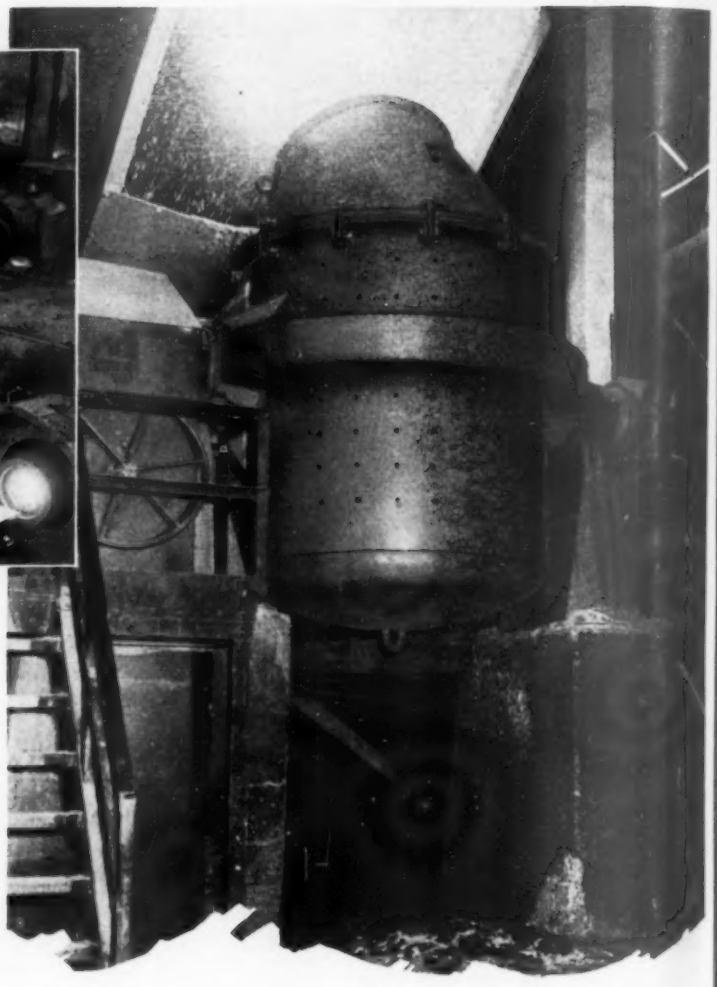

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The new Thor "Bantam" Rotary Air Grinders are the ideal small-wheel grinders for shop, laboratory, or work bench. They handle all accessories; work in practically every material. Have the right speeds and power for grinding with abrasive wheels and points; for cutting with rotary files; routing with steel cutters; polishing with felt and soft rubber polishers; cleaning with wire brushes; and for sanding.

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The small size and light weight of Thor "Bantam" Rotary Air Grinders provide perfect one-hand operation. They handle easily as a pencil for accuracy on precision work; yet their power and sturdy construction assure continuous and efficient performance on hard jobs.

Thor Rotary Air Grinders of the "Bantam" type are available in speeds from 7,000 to 21,000 R.P.M.; in weights from 20 ounces to 5 1/16 pounds; in lengths from 6 3/8 inches to 15 inches.

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000H GRINDER

00H GRINDER

10 GRINDER

	000H	000	00D	00H	10-18	10-15	10-10
WHEEL (Vitrified) CAP. (Bonded)	1 1/4" x 1/2"	1 1/2" x 1/2"	1 1/4" x 1/2" 1 1/2" x 1/2"	1 1/2" x 1/8" 2" x 1/2"	1 1/2" x 1/8" 2" x 1/2"	1 1/2" x 1/2" 2 1/2" x 1/2"	2" x 1/2" 3" x 1/2"
SPEED (r.p.m.)	20,000	14,000	21,000	17,000	18,000	15,000	10,500
WEIGHT	22 ozs.	20 ozs.	3-3/16 lbs.	5-1/16 lbs.	4 1/8 lbs.	4 1/8 lbs.	4 1/8 lbs.
LENGTH	6 1/8"	6 1/8"	9 1/2"	13 1/8"	15"	15"	15"

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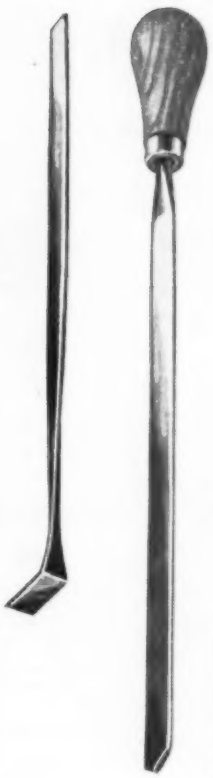

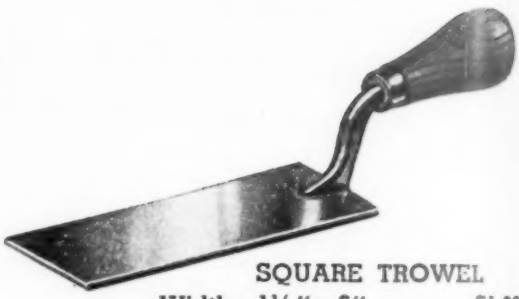

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½"	....	1.30	1.35	1.40	$1.55
¾"	....	1.40	1.50	1.60	1.75

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Government Placing Manpower Problem on Saner Basis; Industry Makes Suggestions

DURING the past month considerable progress has been made in establishing a sound basis for tackling problems of manpower shortages in the foundry industry. At long last Washington doctors seem to have discovered the futility of trying to increase production of certain types of castings simply by organizing committees of top side government officials who are not familiar with problems and needs of industry. No one appears to have been awed by such displays of official interest, least of all the man or woman having prerequisites for foundry work.

Following criticism from many quarters, the bureaucrats evidently have found a way to soft-pedal the flood of government publicity which damned the foundry industry for its working conditions and compensation paid its workers. In its place the WMC with the assistance of the WPB and the Army and Navy, has undertaken a stupendous publicity campaign, using newspapers, magazines, radio and movies to carry the need for foundry workers to every person in the United States. For the past two weeks Paul McNutt, chairman of WMC, has spearheaded the drive for volunteer foundry workers by stressing the importance of the work and the war needs for castings. Foundrymen listening to the radio broadcast of the all-star baseball game at Pittsburgh on July 11 were surprised to hear a plea for foundry workers. Similar announcements, woven around a patriotic theme, will be included in many chain broadcasts and as spot announcements from most stations in the critical areas. Movie shorts are being prepared for showing in most theaters as news reel trailers. Other publicity programs are planned so that every person who reads, listens to the radio or goes to the movies will be well aware that foundries need workers and that it is patriotic to help produce the castings that are needed to finish the war.

This is only one phase of the effort government is making to solve the manpower difficulties. Attention is being given to clearing up cases before the WLB. Foundries needing equipment are promised priority assistance and help in connection with amortization of equipment expenditures. The WMC has told its field men that workers must be found for foundries.

The about-face in the attitude of government agencies was most apparent at the successful regional conference of the Gray Iron Founders' Society held in Chicago July 6. Time and again, speakers representing government agencies indicated the big job of increasing production of castings rests with *management* and *workers;* that the government, although willing and ready to render every possible assistance, cannot solve this foundry manpower problem alone.

Discussions at that meeting by representatives of both government and industry were most constructive, and in the main indicated a basis of understanding of the fundamental problems effecting the procurement of castings in sufficient quantities to meet the needs of war production. The following resolution, adopted by the conference after full discussion in executive session, outlines certain recommendations which should aid the manpower shortage problem providing Washington acts favorably.

WHEREAS: The War Production Board has declared that production of various items of the strategic program of the war is jeopardized by a drop in the production of certain types of gray iron castings, and

WHEREAS: It is the sense of this meeting that this situation is attributable to the shortage of manpower prevalent in the industry, and

WHEREAS: It is the belief of these present that this situation can at least be improved if not totally eradicated if certain steps are taken without delay, be it

RESOLVED: That in order to hold present manpower and maintain present production the War Production Board and the War Manpower Commission be urged to invoke the assistance of the President of the United States in directing Selective Service boards throughout the country to defer those skilled men under 26 years of age and all men over 26 years of age called before them who work in gray iron foundries, until such time or times as the War Production Board may find the present critical foundry situation to have passed. And be it further

RESOLVED: That in order to increase present production the President of the United States be requested by the War Production Board to furlough to the foundries such former employees of skilled foundry classifications now serving in the armed forces of the United States as are located within the continental limits of the United States and not occupying critical positions in such forces until the present foundry emergency be declared passed by the War Production Board. And be it further

RESOLVED: That in order to eliminate the migration of patterns the Office of Price Administration permit the optional use of the formula method of pricing in lieu of present base period prices as covered by Maximum Price Regulation No. 244. And be it further

RESOLVED: That in view of the economic status of the gray iron foundry industry, consideration be given to current costs in the development of formula pricing. And be it further

RESOLVED: That the War Production Board consider the entire problem of castings procurement and indicate to foundries those castings which are most urgently needed for the war effort. And be it further

RESOLVED: That the members of the industry here present express their entire confidence in their Advisory Committees to the War Production Board and the Office of Price Administration. And be it further

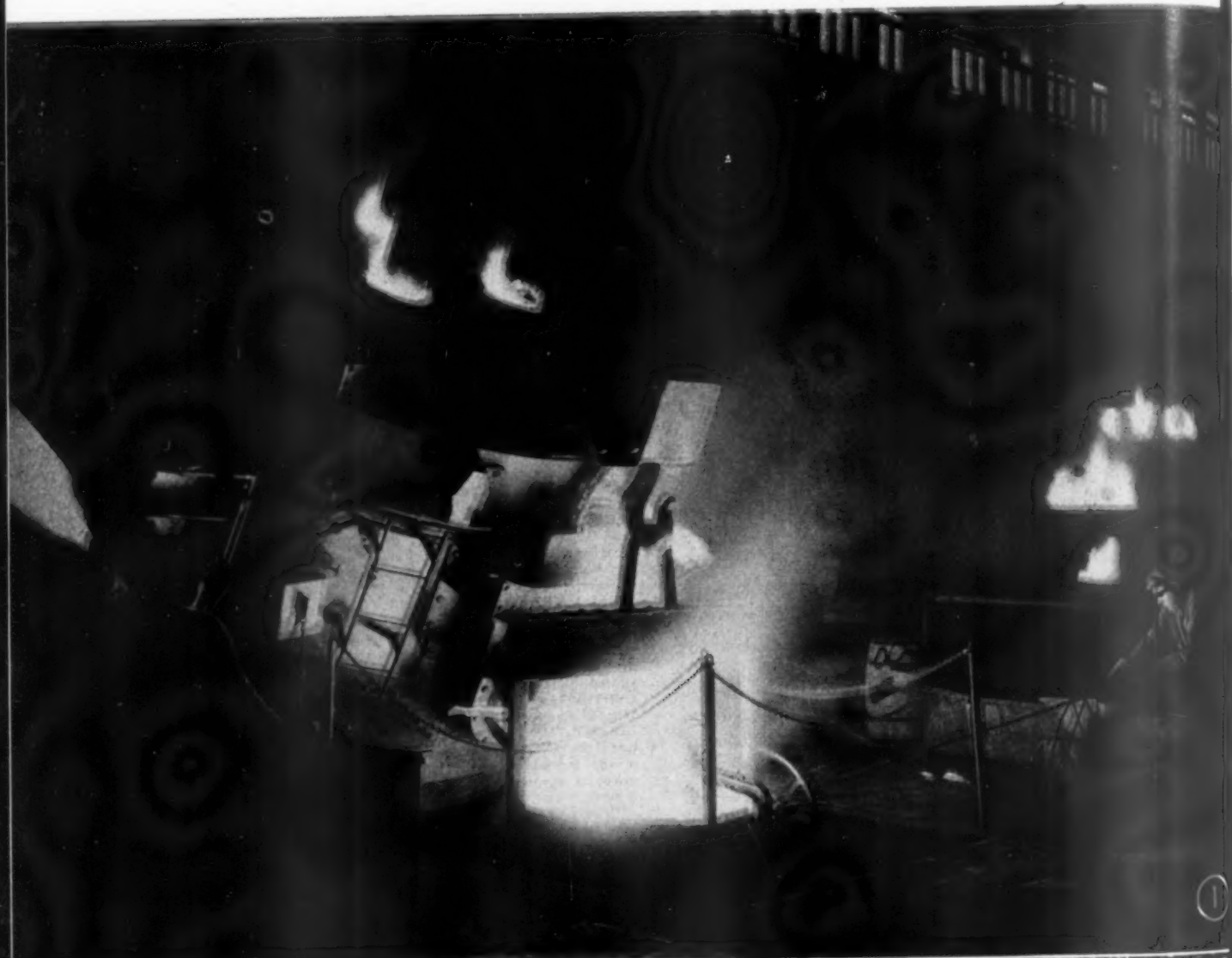
RESOLVED: That no effort will be spared by this industry to co-operate fully with government agencies and labor with a view to meeting the present emergency squarely and expeditiously.

The saner approach is all to the good. But it should be remembered that the *critical* manpower situation affects only a relatively small number of the 4800 foundries in the United States. While most foundries need more workers, the situation in the vast majority of instances is not sufficiently critical to justify much of the hullabaloo created by Washington in recent months. Sometimes the hunter finds it better to use a high-powered rifle than a shotgun.

Frank G. Steinbach
Editor

By ERLE F. ROSS
Chicago Editor
THE FOUNDRY

HANDLING MATERIA



EALS in the Crane Steel Foundry

WAR has created unprecedented demands for cast steel valves, flanges and fittings, to meet the requirements of new construction programs in shipbuilding, petroleum refining, synthetic rubber and chemicals manufacture, steelmaking, power generation, and other industries. Aside from being required in previously unheard of quantities, the castings must meet rigid specifications for service involving high pressures, high temperatures, or unusual conditions. Accordingly, production facilities of valve makers have been taxed to the limit since early in the war program.

In the main, however, manufacturers have accommodated themselves superbly to the load imposed upon them, and, after the first few months of general confusion following Pearl Harbor, few serious delays in war construction and production have been attributed to a shortage in valves and fittings. For the most part, the required high output has been achieved by maximum utilization of existing capacity rather than by extensive plant expansion.

One of the country's large valve manufacturers which found itself in a position to make a notable contribution to the war effort was the Crane Co., Chicago. Long committed to the policy of maintaining its facilities up-to-date through adoption of improved production methods and installation of more efficient equipment, this company in early 1942 was just completing an extensive modernization of its steel foundry and castings cleaning department to provide progressive or straight-line output. This undertaking placed major emphasis on maximum mechanical handling of materials and product.

By speeding up completion of this program, full productivity soon was attained. In the meantime, however, war demand for valves required that capacity be increased further and quickly. This was accomplished partly by installing some additional equipment, partly through more ingenious utilization of existing floor space, and to some extent by improving overall efficiency. A significant point is that by avoiding construction of new buildings the company aided the war effort by conserving critical materials and labor.

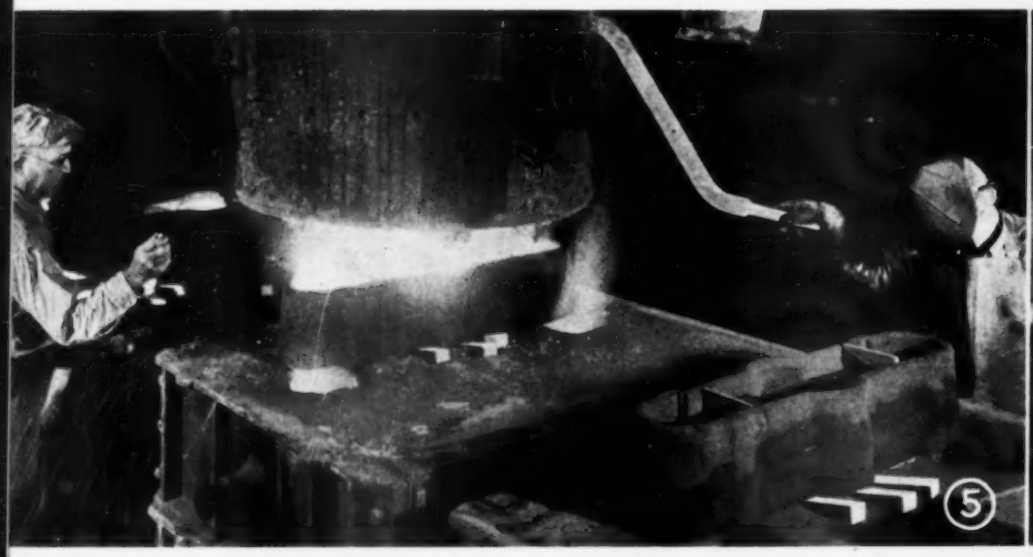
Steel for castings is made in electric arc furnaces operating on basic melting practice. Considerable advantage is derived through basic melting because it permits the factory to utilize all its own scrap, consisting of turnings, borings and flashings, many tons of which are pro-

Fig. 1—Tapping a heat of steel from one of the 6-ton capacity electric furnaces after test specimens have been sent to the laboratory by pneumatic tube and analysis has been approved by telautograph

Fig. 2—Steel for castings is melted in this bank of swinging-roof, top-charge, electric arc furnaces. Elevator which lifts buggies of scrap from the basement is shown between the two right-hand furnaces

Fig. 3—Molds for steel valves and fittings are made and poured in this highly-mechanized section of the molding floor. Molding stations are shown at left rear. Molds are poured on the stationary roller conveyors, then pushed off onto the power-driven mold conveyor shown in foreground. The two workmen are returning empty flasks to the molding stations

Fig. 4—This view in the cleaning department shows the chipping operation. Castings are brought from the foundry to the cleaning room in steel baskets by the main conveyor. This conveyor is of such length that 8 hours is required for a round trip



duced daily. This scrap does not have to be shipped out of the plant, nor is it necessary to purchase large tonnages of special grades, all of which would involve much handling labor, storage space, and railroad transportation.

To provide precise metallurgical control in melting and to obtain high recovery of alloying elements contained in scrap produced in the plant, proper identification and segregation of scrap is a requisite. To this end, turnings and chips are gathered from machines systematically and placed in boxes or other containers bearing color designations identical with those borne on the original stock, whether this be steel bars, forgings or castings. Like most manufacturers, Crane Co. has a standard system of contrasting color paint markings to denote steel compositions.

Sprues and gates are kept within the confines of the foundry and therefore remain under the eyes of melting department personnel. Forge scrap, such as flashings, and bar ends from the machining of bar stock, also properly identified, are loaded into steel hoppers and transported by industrial truck to the melting department. The turnings and chips are transported in a similar manner to the chip crusher. Here the stringy turnings are crushed and the chips shoveled into perforated baskets of centrifuges in which they are spun at high speed and the oil is thrown out. Each month thousands of gallons of oil are recovered in this manner.

Different compositions of turnings are crushed separately, moved to the melting department and used in the electric furnaces according to their alloy contents. This permits their being utilized in heats of the same composition, or of similar composition with lesser alloy content.

Two of the four direct-arc furnaces are 6-ton capacity, the others are 3-ton and 1-ton, respectively. This range in capacity provides adequate flexibility for economical production runs on castings of varying compositions. The units are of the swinging-roof top-charge type which eliminates hand charging. The charges are dropped into the open furnaces from buckets handled by an overhead crane. Separate buckets for the 6-ton and 3-ton furnaces are kept in a pit close-by, each bucket holding a complete charge. Scrap is accumulated in the basement beneath the charging floor, where it is loaded into buggies which are lifted on an elevator, rolled on a short track and turntable to the proper bucket and dumped by a specially-designed air-operated buggy tipper.

Fig. 8—Sand is cleaned from castings by means of high-pressure water blast, the pressure being 1200 pounds per square inch. Castings are supported in chain slings from a monorail conveyor

Bucket Charging Saves Time

To charge a furnace, the roof is raised 6 to 8 inches and swung horizontally sidewise. The loaded bucket is carried by the crane into position over the furnace where the rope holding together the hinged segments of the bottom quickly burns off, dropping the charge into the furnace. This operation requires about 3 minutes, compared with a former average of 40 minutes for hand charging, a significant saving of time as well as manpower.

Two features of furnace practice are worthy of note. One is the use of water-cooled slag skimmers to reduce the hardship of this disagreeable task of steelmaking. Aside from making skimming less trying, water-cooled skimmers last longer and are more economical than plain ones from the standpoint of replacement. The other feature is use of a pneumatic tube system for delivering test specimens of furnace heats to the laboratory which is

Fig. 5—Close-up of pouring a mold, using a bottom-pour ladle

Fig. 6—Heat treating of steel valve castings is accomplished in this battery of gas-fired, car-bottom type furnaces, each having a capacity of approximately 15 tons. Cars are equipped with heavy grids to raise castings off the car floor and permit free circulation of gases

Fig. 7—Castings suspended from the conveyor in chain slings pass balcony stations where they are cut free from gates and risers by torch. Gates and risers remain in the slings, the castings drop down onto the annealing car shown below

some distance away from the melting department.

Foot delivery of specimens formerly required 5 to 7 minutes, a period which delayed running of chemical analyses and phoning instructions back to melters. The tube system dispatches the specimens to the laboratory in a matter of seconds. Analysis of carbon steel for carbon, manganese and sulphur, can be made in 7 minutes; of carbon-molybdenum steel for carbon, manganese, molybdenum and sulphur, in 15 minutes; and of chrome-molybdenum steel for carbon, manganese, chromium, molybdenum and sulphur, in 20 minutes. Since telephoning instructions to the furnaces was subject to the hazard of misunderstanding, a one-way telautograph was installed, which eliminated possible error in transmission of data.

Molds are made and poured in a bay adjacent to the electric furnaces. Briefly, the facilities include a power-driven mold conveyor operating in a rounded corner rectangle approximately 68 feet wide and 162 feet long surrounding four groups of stationary roller conveyors, each group serving two molding machines. The eight molding machines, four being jolt strip units and four jolt squeeze strip units, are lined up close to one side of the mold conveyor.

About 50 per cent of the time the practice is to make up green sand cores from facing sand, at other times to use dry cores from the core- (*Please turn to page* 182)

MAGNESIUM CASTINGS by DODGE CHICAGO PLANT

By WILLIAM G. GUDE
Associate Editor
THE FOUNDRY

SUPERLATIVES are necessary in describing the huge plant on the edge of Chicago where the Chrysler Corp. is building 18-cylinder, 2200-horsepower, Wright air-cooled engines for the Army Air Force's B-29 and other large aircraft. This undertaking by the corporation's Dodge Chicago Plant is unusual in a number of respects. Its size naturally is its most talked-of feature, although the tremendous amount of planning and doing which made it possible in such a short period of time, is equally noteworthy.

Probably nothing in the war production program better typifies the enormity of the global war in which we have been engaged than does the Dodge Chicago Plant—known as the world's largest aircraft engine plant—especially since it is a unit that was designed and built primarily for the production of only one type of engine. And typical of the outstanding accomplishments in the excellent war job which industry has done is the increasing flow of these engines from a plant whose site only a short time ago was practically prairie land.

Chrysler Corp. received its first contract for production of the superbomber engines early in 1942. By June 4 of that year plans for the new plant were sufficiently advanced to permit breaking ground for the first building, the tool shop, and by October more than 16,000 were employed three shifts a day on construction work. Machinery and equipment was being moved into some buildings before the foundations for others were laid. Meanwhile the difficult task of recruiting and training the thousands of workers and supervisory staff members required to operate the plant was under way.

Some units were completed and able to start operations before other departments, but construction of the entire plant took only about a year despite various handicaps, including a late WPB-directed change in building design from steel to concrete construction. Since the Dodge Chicago Plant is more than an assembly works—it makes and fabricates its own forgings as well as castings—the actual start of shipments of finished engines necessarily awaited

The greatest concentration of light metal casting capacity in one plant is to be found at the mammoth Dodge Chicago Plant, where Wright 2200-horsepower engines are being made for the B-29 bomber. This article describes the production of magnesium castings. The aluminum foundry will be discussed in the September issue.

Fig. 1—Pouring engine nose piece. A pyrometer held in the crucible permits constant check of pouring temperature

the co-ordinated operation of the different departments. Nevertheless, by early this year the plant was in quantity production, delivering regularly an unspecified but substantial number of engines.

The plant comprises 19 major buildings and nearly a score of smaller structures distributed over 500 acres of ground. To give a better appreciation of the size of this area it should be mentioned that the fence surrounding the plant is approximately 4 miles long and that the parking lot is 1 mile long, a block wide, and will accommodate 8000 cars. Tunnels for passage of the workers lead from the parking lot to the plant buildings.

Largest of the various buildings is the machine and assembly shop. Covering the equivalent of more than 50 city blocks, this one-story structure is the leviathan of all buildings, exceeding even Washington's famed Pentagon in amount of floor area. Its ground floor is devoted almost entirely to production purposes, since washrooms, cafeterias, kitchens and other services are confined to the basement.

Castings are produced in twin structures located between the forge shops and the machining and assembly building. Identical in size and exterior appearance each of the two foundry buildings is 750 feet long and 480 feet wide including offices. From the standpoint of casting capacity each is said to be the largest of its type in the country. For some time the foundries have been melting daily more than 125,000 pounds of aluminum and 50,000 pounds of magnesium.

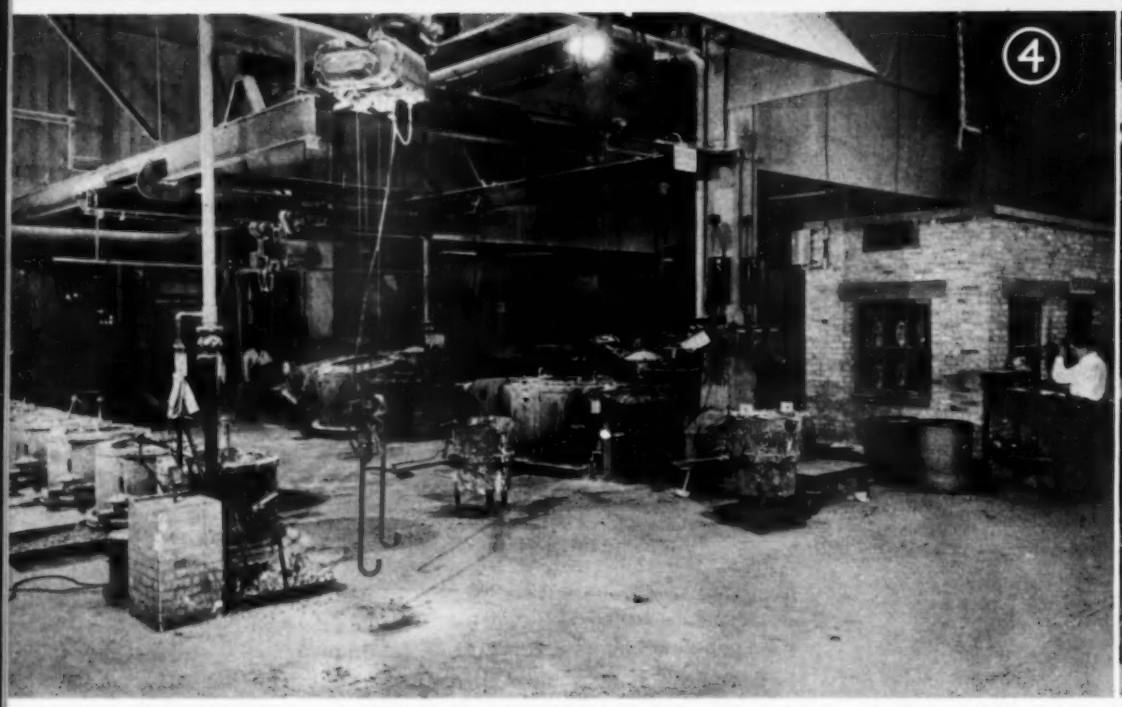
Each foundry is self-contained, operating independently of the other, and by occupying separate buildings the problem of segregating raw materials is simplified. Both buildings are reinforced concrete structures of a special design incorporating a ribbed concrete arch roof which effected a large saving in use of reinforcing steel—an important consideration when the plant was built. Floors throughout the foundries are concrete. Side windows provide some natural light, although the size of the buildings makes necessary the liberal use of artificial illumination. Both fluorescent and incandescent lights are located effectively to provide adequate lighting at work stations, and give a general bright appearance throughout the foundry. Effective ventilation is maintained, particularly at points where smoke, gas or dust normally prove troublesome.

Mechanical Equipment Speeds Production

One of the most striking features of both foundries is the extensive use made of mechanical and roller conveyor systems to facilitate the flow of production. This is apparent in the accompanying views, all of which are of the magnesium foundry, and possibly is even more evident in the aluminum foundry where production is concentrated on only one type of casting, the finned cylinder head. Eight different magnesium castings are produced, these ranging in size from a sump, weighing 14 pounds, to the large nose piece which weighs 84 pounds. The latter is illustrated in Fig. 5 and is shown being poured in Fig. 1.

The magnesium foundry is laid out with sand preparation equipment located at one end of the building, and with production progressing in a straight line through the succeeding steps of molding, baking, core assembly, pouring, shaking out, cleaning and inspection. In certain respects the operation strongly resembles the production and assembly methods commonly employed in the building of automobiles.

All of the magnesium castings made at this foundry are poured in core assemblies rather than in flask molds, and since only one grade and mixture of sand is used for



molds for all castings and no special facing sand is used, the complications frequently involved when it is necessary to provide varying mixtures are avoided. When running at full capacity the Dodge Chicago Plant foundries will use about 400 carloads of sand monthly, although this will involve little additional new sand since a thermal processing system reclaims more than 95 per cent of the sand used.

Sand is prepared at a station located on a balcony having elevated runways leading above the molding lines, which parallel the building lengthwise on the main floor. Sand preparation equipment includes two batteries of three muller type mixers, each of 1200-pound capacity. Composition of the sand mixture is 75 parts of sand of 65 grain size to 1 part of oil, plus 1 per cent cereal binder and 5 per cent water. Boric acid is not used as an inhibitor because of the difficulty of reclaiming sand so treated, but the molds are sprayed with a fluoride solution. This sand mixture has a permeability of 140, and the molds are not vented.

After thorough mulling, the mixer's contents are deposited in a car which is pushed by hand over a track on the runways above the molding stations, and emptied into chutes leading to wood hoppers on the main floor, such as those shown at the left of the molding line in Fig. 2. A continuous monorail rack conveyor travels alongside the parallel molding lines to carry away the mold components as they are completed. Molding is done on hand-rollover jolt machines in some cases, such as the one illustrated. Large copes and drags are rolled over with the assistance of a hoist. Trunnions projecting from the center of opposite sides of the corebox are provided for attaching the hoist sling and permit the mold to be rolled after it is lifted. Patterns from these molds later are drawn by

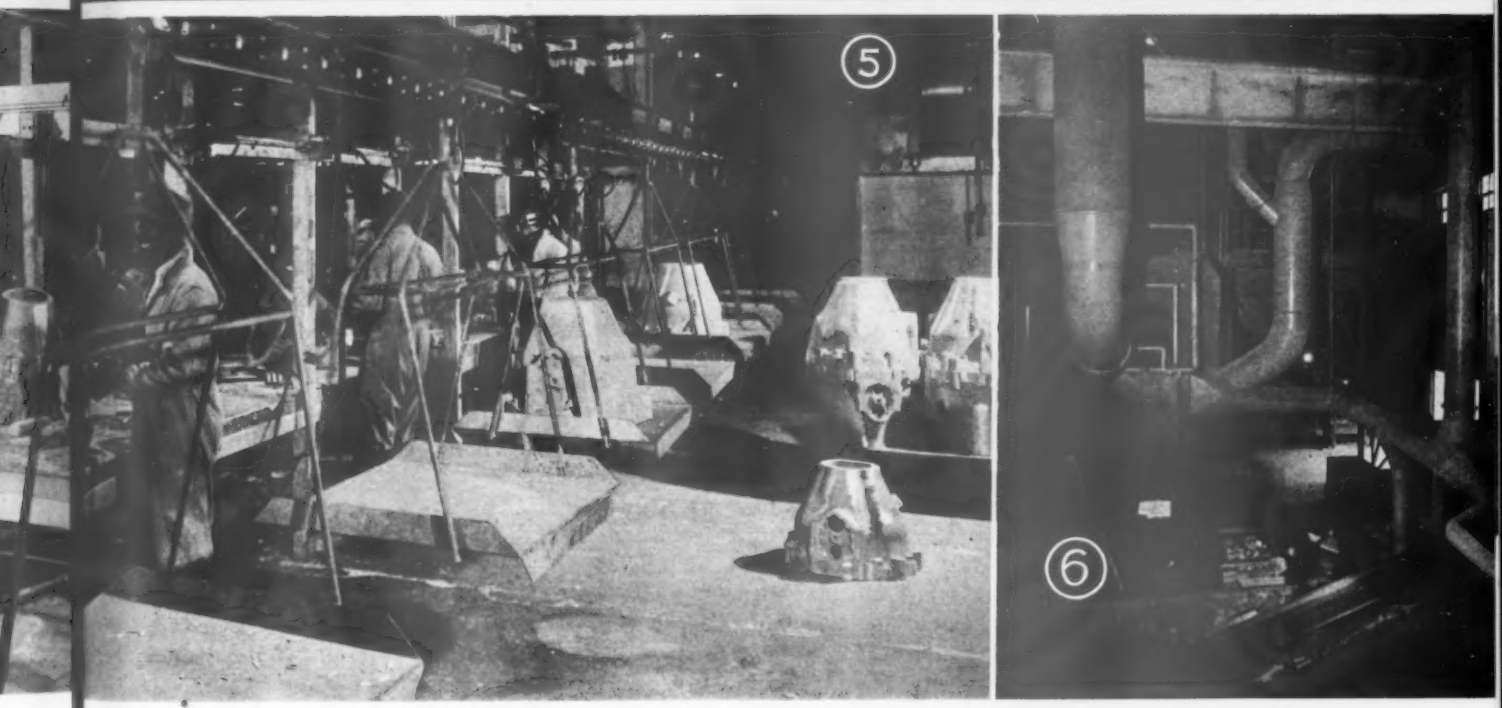
Fig. 2—Portion of one of the molding lines of the magnesium foundry, showing conveyor for carrying molds to baking ovens

Fig. 3—Molds being assembled after leaving spray dry oven

Fig. 4—One of the five magnesium foundry melting stations, showing control room at right. More than 50,000 pounds of magnesium is melted daily at this foundry

Fig. 5—Castings are brought by monorail conveyor to benches for rough cleaning prior to polishing in booths

Fig. 6—Part of thermal sand reclaiming system, showing exhauster for removal of fines



machine, one draw machine handling the molds from four stations.

As is usual practice in compensating for the high shrinkage of magnesium, liberal use is made of risers to assure adequate feeding of the castings, particularly in heavy sections. Asbestos sleeves are employed to assist this feeding of the larger castings by retarding the rate of solidification of metal in the risers. Four thicknesses of No. 12 sheet asbestos are wrapped in cylindrical form and slipped over the riser sections which are integral parts of the pattern. When the mold is made and the pattern is drawn, the asbestos sleeves are held in placed by the sand, snugly lining the riser cavities. Careful arrangement of gates and risers makes necessary the use of relatively few chills in any of the molds.

Molds travel on the conveyor racks into the four gas-fired baking ovens where they are held for 4½ hours at a temperature of 360 to 390 degrees Fahr. Upon emerging they are sprayed with a fluoride solution, in order to inhibit oxidation of the metal in the mold, and then are conveyed through a spray dry oven. Exit side of one of the two spray dry ovens is shown in the center background of Fig. 3, with a number of molds removed from the racks to roller conveyors preparatory to placing of internal cores and closing. Copes and drags move over adjacent lines for assembly, and in being joined, after accurate positioning with the assistance of locators, are sealed with an oil and talc mixture applied to the parting line. Molten sulphur is used in pasting together sections of the built-up internal cores.

The melting department is not enclosed, although a large hood, shown in Fig. 4 and exhaust system above the furnaces prevent smoke and fumes from drifting to other parts of the foundry. Melting (*Please turn to page* 178)

cupola practice

by

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Reasons for using cupola melting equipment, and basic principles which must be observed for successful operation, are discussed in this first installment of a paper presented before the Quad City Chapter of the A.F.A.

THE cupola always has been the standard melting furnace in the gray iron foundry, although from time to time many foundrymen have been apologetic for continuing to use this type of furnace when finances and competition have suggested the possibility of using some other type of melting unit. Twenty years ago one would have looked far and wide to find a cupola anywhere except in a gray iron foundry or used in melting iron for the bessemer charge in a steel mill. Today, the cupola is not limited to the gray iron industry. Close to 90 per cent of this year's production of malleable iron will be produced by the duplexing process involving cupolas. A number of steel mills are using cupolas to produce hot metal for electric or open-hearth furnaces or triplex steelmaking processes. It is being used to melt bronze, to produce insulating materials such as "mineral wool," and elsewhere, as in the production of wrought iron.

We might be less apologetic for employing a cupola to melt gray iron if we realized that its applications were broadening, but this increased use alone would not justify its retention to melt gray iron. That it is eminently adapted to melting the iron-carbon-silicon alloy in the percentages of elements which make gray iron, and that it probably is better adapted to melting this type of alloy than any other type of melting furnace, is sufficient reason why this type of furnace should continue to be the standard melting furnace of the gray iron foundry industry.

Reasons for using cupola melting equipment are many and diverse and not all of them may be pertinent to any one application, but all these reasons should be known to the cupola operator in order that each one may be employed as the occasion may require. The most important ones follow.

Continuous Melting—The cupola is the only melting furnace which accurately may be termed a continuous melting furnace. After a brief adjustment period at the start of the melting period, usable metal is being produced every minute the furnace is in service and the continuity of this melting operation may continue for hours, days, weeks or months. Most gray iron foundry operations are based on one or two 8-hour shifts a day, consequently the need for metal may be satisfied by melting for a few hours up to 16 hours. However, when metal is needed over a 24-hour day for long periods of time the cupola can and has been employed in such service.

Blast furnaces frequently are in continuous service for 3 to 7 years before they are shut down for relining, and should the occasion ever arise to employ a cupola continuously for periods equivalent to those of a blast furnace, it will only be necessary to select the proper refractories and provide for their sufficient water cooling. Recently I saw a cupola that had (*Please turn to page* 196)

DETERMINE SULPHUR in BRASS and BRONZE by COMBUSTION METHOD

By ALBERT C. HOLLER
and
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AT THE present time large amounts of brass and bronze scrap of unknown composition are being used in the brass industries. By unknown composition, we mean the amounts of impurities as sulphur, arsenic, antimony, silicon, iron and aluminum are unknown. Also it is known that sulphur in brass and bronze causes red shortness, segregation[6, 9], discoloration, and sluggishness in pouring. The sulphur as hydrogen sulphide, sulphur dioxide and sulphates is absorbed by the molten or semi-molten metal and forms a eutectic of copper as Cu_2S[1, 3].

In order that close control might be maintained and in order that the previously mentioned difficulties might be eliminated, it was necessary to find a procedure for the determination of sulphur that would be very rapid and accurate, and operated by the usual laboratory helpers.

The wet methods[2, 11] were found to be too long and time consuming for rapid control work and after a thorough search of the literature, it was decided that the combustion method[4, 5, 7, 8, 10] would be suited best for the rapid determination of sulphur in brass and bronze. The present description covers the method in detail.

The combustion method for the determination of sulphur involves three steps:

1. The oxidation of the sulphides to sulphur dioxide by burning the sample in a stream of oxygen at 2100 degrees Fahr. This reaction is represented by equation (a) and takes place in the combustion boat.

$$\text{(a)}\qquad Cu_2S + 2O_2 \xrightarrow{2100^\circ\ F.} SO_2\uparrow + 2CuO$$

2. The formation of sulphuric acid by the oxidation of the sulphur dioxide to sulphur trioxide by hydrogen peroxide. This reaction is represented by equation (b) and takes place in the absorber.

$$\text{(b)}\qquad SO_2 + H_2O_2 \rightarrow SO_3 + H_2O \rightarrow H_2SO_4$$

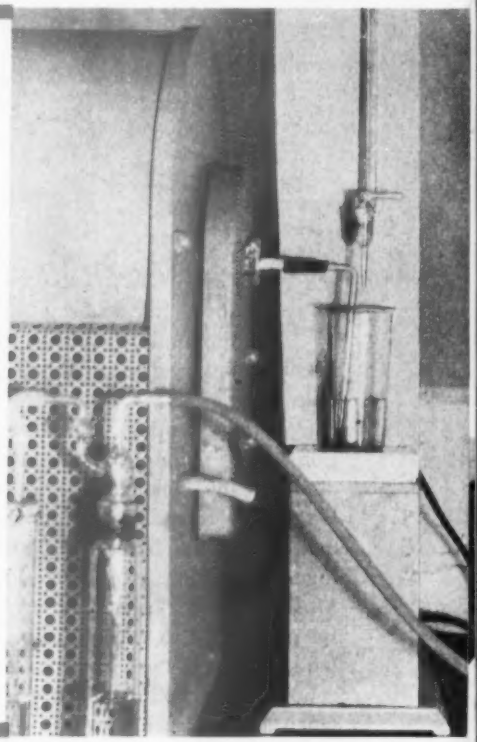
3. The titration of the sulphuric acid formed with a standardized sodium hydroxide solution.

Chromium sesquioxide was found to be the only suitable bedding material[12] for use in the combustion boats. By its use the complete oxidation of the sulphides in the sample was obtained and one combustion boat could be used for 20 to 30 determinations before discarding it.

For samples of brass and bronze that did not contain graphite bromthymol blue (pH range 6 to 7.6) was found to be a suitable indicator in the titration. For those samples that contained graphite, as some bearing bronzes do, bromcresol green (pH range 3.8 to 5.4) was used as an indicator. Therefore, it was decided to standardize the procedure and use bromcresol green throughout.

It was found that the exit end of the combustion tube should be packed with ignited asbestos to prevent the metallic oxides (zinc oxide, copper oxide, etc.) that might vaporize, from condensing in the delivery tube and catalyzing the formation of sulphur trioxide before the gases reached the absorber. If low results are encountered, the tube should be repacked and the delivery tube thoroughly cleaned.

In high zinc alloys as 70-30 brass, no difficulty was encountered in the combustion of the samples. By following the procedure as outlined, no zinc fume (ZnO) was given off during the combustion. Many brass samples were run and equal success was obtained with brasses and bronzes. In the work reported no data is given on brasses because a standard sample that contained sulphur was not available.

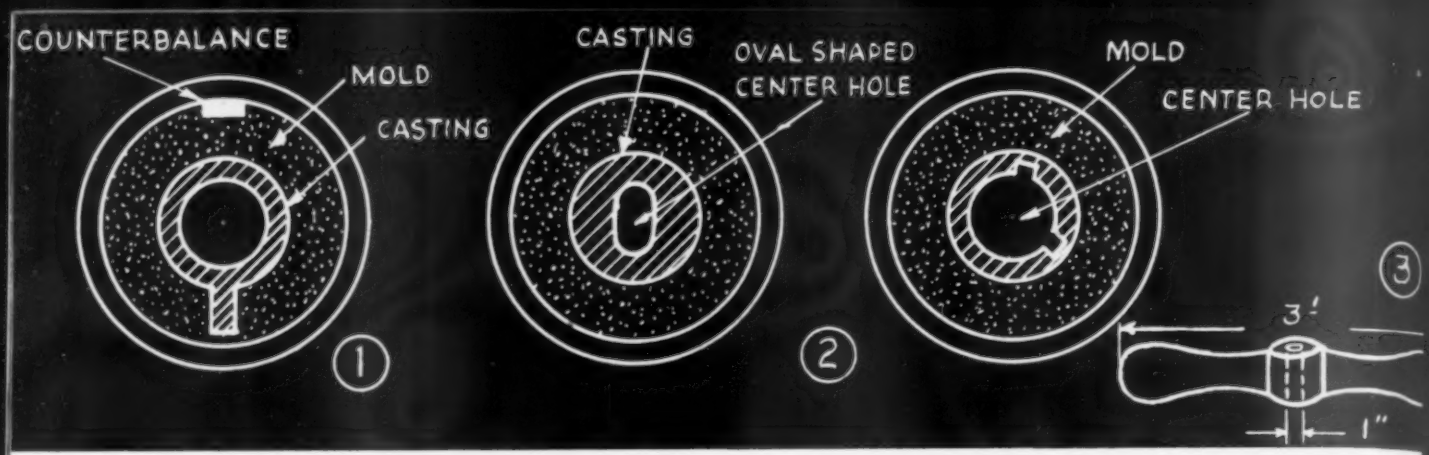


To test the accuracy of the procedure, samples of National Bureau of Standards standard sample No. 124, ounce metal (0.071 per cent sulphur), were run. The average accuracy was 0.0013 per cent absolute.

The accompanying illustration shows the complete combustion train, which consists of a variable temperature combustion furnace, a gas purifying train, delivery tube and absorption beaker.

Gas purifying train is made up of three absorption jars; the first (gas inlet) contains concentrated sulphuric acid, the second contains a 35 to 40 per cent solution of potassium hydroxide and the third contains ascarite in the upper half and calcium chloride in the lower half.

Combustion tube is the zirconium silicate (*Please turn to page* 208)



It can be Cast Centrifugally

CENTRIFUGAL casting was utilized originally as a method for making simple pipes. Progress in technique and changes in demand have since made possible the production of complicated shapes and multiple castings.

Generally, castings made centrifugally, as differentiated from those made by the *centrifuged* method, should be diametrically balanced about the axis of rotation. So long as the central hole is on the axis of rotation and symmetrical to the bore, the castings may include some irregularities such as outside slots, flanges and projections. Most types of tubes and circular castings lend themselves readily to this process, whereas pieces having extended off-sets must be counterbalanced by weights. In centrifugally casting these types, an ideal condition exists when solidification progresses from the outer to the inner wall of the casting. This results in a product with a definite outline and sharp detail not restricted by the pads or fillets of the static process..

Two considerations determine the initial manufacture of metal parts—the quality required and the cost of manufacture. Still another feature—availability—presents itself, and currently it is particularly important.

The chief concern of this paper is to outline the factors which determine the cost of manufacture or the comparative costs as related to the process of completing a part or casting from the raw material.

The basic limitations of the process cannot be well defined, since, with enough expenditure, equipment and research work, it may be possible to spin any castings or group of castings by a method that could be called centrifugal. However, until some such experimental work is done, the following limitations are realized.

Materials should be suitable for the process. Most metals such as pure copper, copper-nickel alloys, aluminum and manganese bronzes, a variety of copper-tin-lead-zinc alloys, gray iron and steel are practical, with some few exceptions, in the ferrous and nonferrous groups. Among these restrictions in the nonferrous group are high-phosphorus alloys which wet the mold and stick badly; high-leaded alloys containing 20 per cent or more lead which tend to "centrifuge"; alloys which are not suitable to the application without further heat treatment (cast iron in permanent molds); alloys which are hot-short and possibly may crack at high speeds (thin-walled sections of silicon bronze which need (*Please turn to page* 190)

Fig. 1—Counterbalance is used when necessary to establish diammetrical balance in the casting about axis of rotation

Fig. 2—Non-cylindrical (left) or slotted (right) bores in uncored openings so far have not been cast successfully by the centrifugal method

Fig. 3—Correct speed of rotation for casting propeller hub would cause force on blade ends to go beyond limits of machine, but reduced speed would result in parabola formation (right) at hub

Fig. 4—Shrinkage common at center of ring blanks with heavy cross-sectional area may be offset by adding stock (right) in the bore

Fig. 5—Nonferrous castings with vertical bore and outlying details at right angles have definite limitations because of dross entrapment

Fig. 6—Castings requiring cored openings will crack as indicated unless collapsible center cores are used to permit contraction

Fig. 7—Centrifuged method or static pouring is preferable when it is necessary to insert pin cores in the area of the surface for bored holes, otherwise metal will wash cores away or show flow lines

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Milwaukee

Fig. 8—Centrifugal casting shown at left as cast, and at right as machined ready for application. Fig. 9—Examples of centrifuged castings. Casting at left is gray iron. Casting at right, made of copper base alloy, had sprue poured statically and then was spun. Fig. 10—Typical centrifugal castings

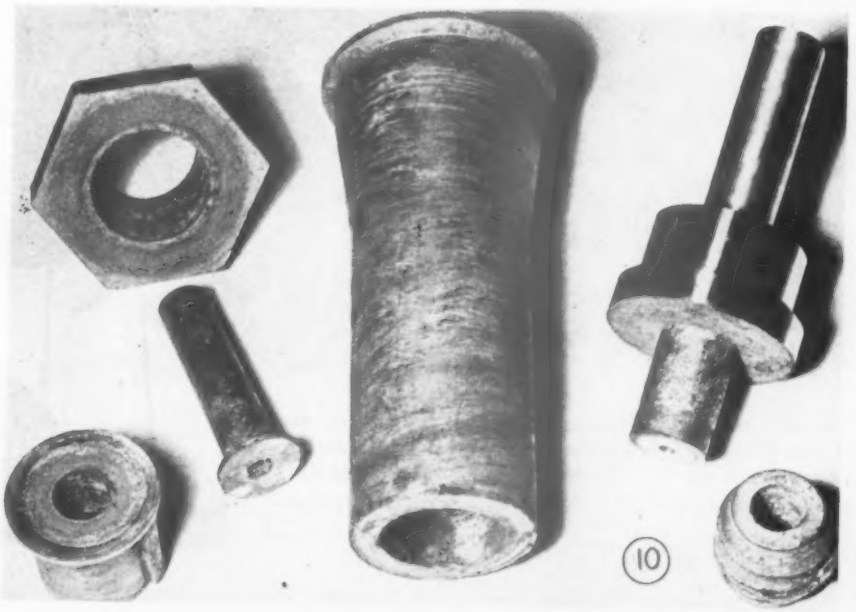

Fig. 1—Models of graphite whorls, magnified 150 diameters

HENRY MARION HOWE was one of the great thinkers who develop from time to time to whom is given the rare gift of synthesis. Analysis is given to few, but synthesis, the ability to show the relation of all parts to each other and thus to give a clear picture of the whole, is reserved for the very few. Analysis can be achieved by honesty, intelligence, and industry, but synthesis is only given to genius.

Professor Howe's crowning achievement is the picture of the whole iron-carbon series shown in Fig. 4, which places steel, malleable, gray iron, mottled and chilled irons in their proper relation to each other and shows the essential unity of the series. Perhaps his best statement of the case is found on page 90 of the *Metallography of Steel and Cast Iron* in these words: "Each member of the gray cast-iron series consists of the metallic matrix approximately equivalent to that member of the steel-white-cast-iron series to which it corresponds in percentage of combined carbon with its continuity broken up—by masses of graphite . . ." Apparently he had taken considerable interest in this idea around the turn of the century, for he refers to a discussion at the Franklin Institute in 1900 in which he said: "Though many others had probably conceived this relation between the steels and cast irons, it was here enunciated for the first time, so far as I know. It was received with great incredulity."

The concept was explained in some detail in a paper on "The Constitution of Cast Iron" presented before the A.S.T.M. in 1902 when Professor Howe was retiring president of that young society. In the discussion Dr. Sauveur stated that he was "very well acquainted with Professor Howe's theory of the constitution of cast iron," and went on to say that while he "shared it to the fullest extent, some foundrymen . . . claim cast iron is a metal entirely different from steel . . . that steel and cast iron have very little in common, and that therefore the knowledge gained in the study of steel is of little or no value in the study of cast iron." Dr. Moldenke, in discussing the same paper, said he had been working on the same theory for 12 years but he laid no claim to publication.

Discussing the difference in the microstructure of the metallic matrix, Professor Howe pointed out that "such minor structural differences are indeed to be expected, because of the difference in the conditions under which these constituents are generated.

Gray Iron—Steel plus

By JAMES T. MacKENZIE
American Cast Iron Pipe Co.
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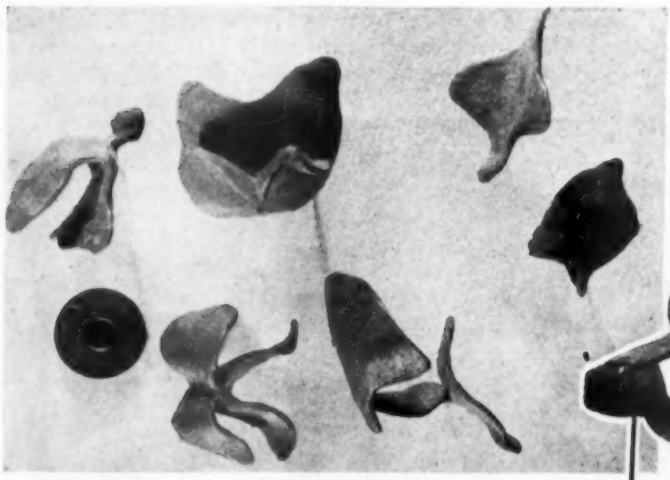


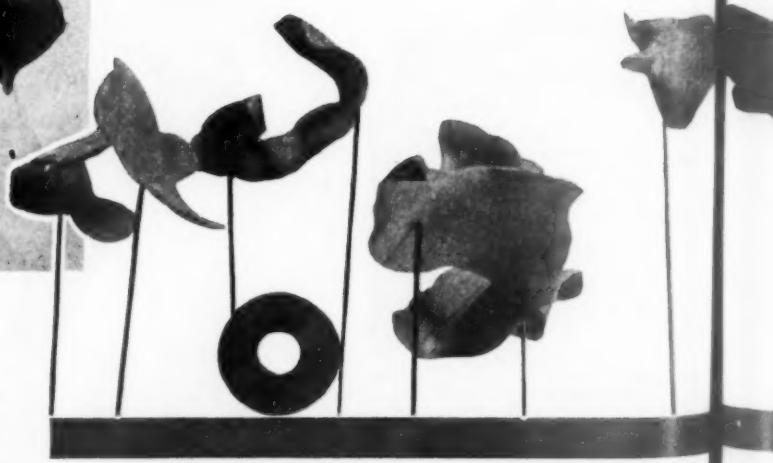
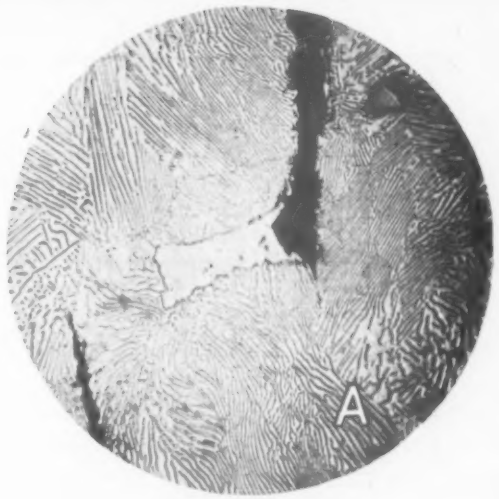
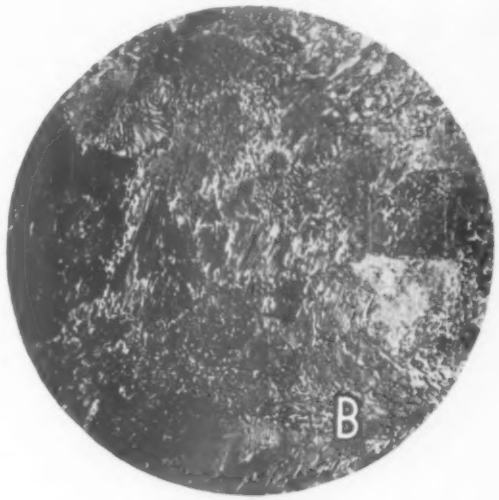
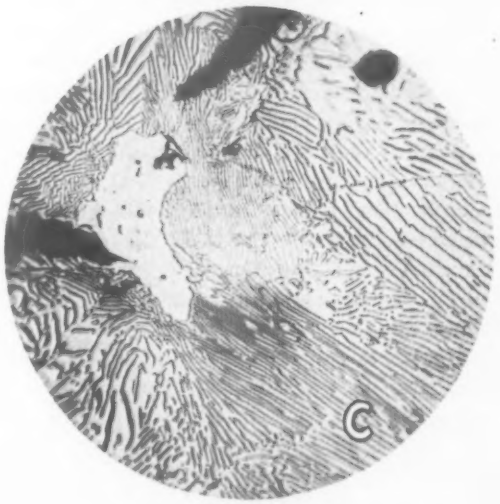


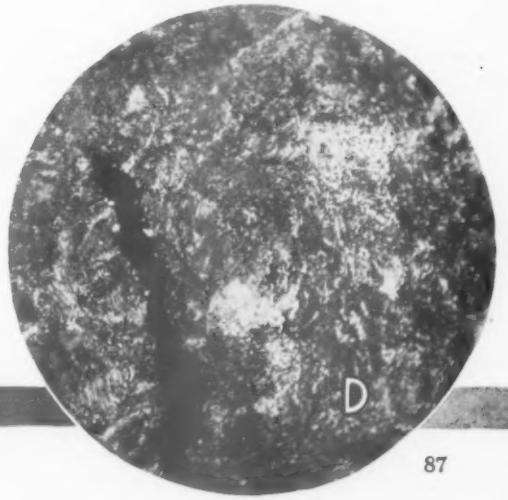
Fig. 2—(Above and right)—Models of graphite flakes set up in space relationships, magnified 150 diameters. Views shown are taken from top, side and end, and depict the arrangement of the graphite flakes in the matrix

Fig. 3—(Right)—Cast iron etched with 2 per cent ni d, 875 diameters. A-Cast 9/15/43, as cast. B-Cast 9/15/43, heat treated. C-Cast 9/17/43, as cast. D-Cast 9/17/43, heat treated







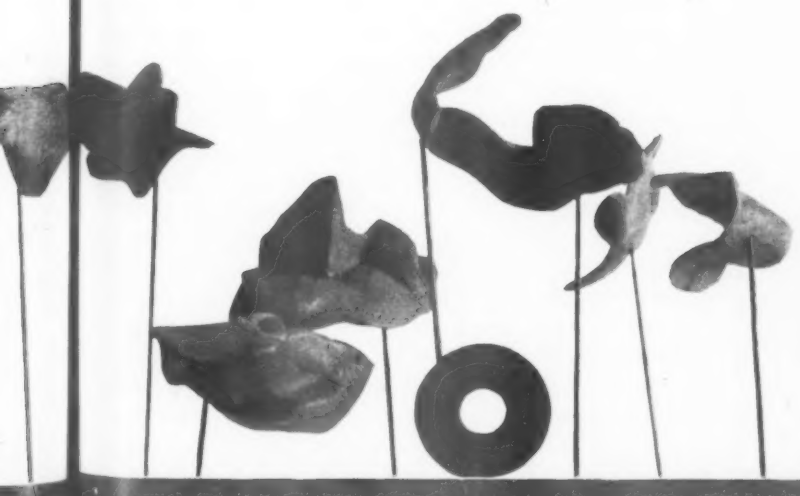


"One difference in these conditions is that the steel of most micrographs has been either forged or at least treated thermally in such a way as to give a new structure radically different from that which formed during the initial solidification, whereas the cast irons have not. Hence what we see in the steels is a transformation structure, but in the cast irons a solidification structure. By giving the cast irons a suitable thermal treatment, they too can be given a transformation structure much closer to that of steel."

Today large tonnages of cast iron are heat-treated—some annealed, some normalized, some quenched and drawn. Two examples are shown in Fig. 3 coming out of commercial production. These are 3½ inches diameter bar stock of low total carbon (2.4 per cent). The as-cast structures show coarse pearlite and had a tensile strength of 39,000 pounds per square inch with a brinell hardness number of 235 to 255. The structures after heat-treatment (normalized at 1700 degrees Fahr.) gave tensile strengths of 53,000 pounds per square inch with a brinell of 285—a great improvement due to transformation of

...Graphite

...rom the Howe Memorial Lecture presented at the New York ...eeting of the American Institute of Mining and Metallurgical ...ngineers. The second part will appear in September.



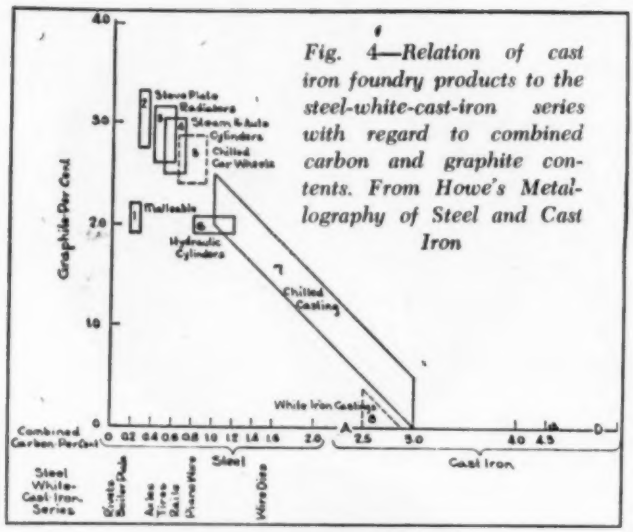


Fig. 4—Relation of cast iron foundry products to the steel-white-cast-iron series with regard to combined carbon and graphite contents. From Howe's Metallography of Steel and Cast Iron

the matrix, since the graphite was changed practically none at all by this treatment.

The mechanism of the formation of graphite, ("Gray iron," unless qualified, in this paper refers to normal hypoeutectic irons) has been studied by many metallurgists, but the most concise and clearest statement of it was made by Alfred Boyles after a thorough investigation presented before the American Institute of Mining and Metallurgical Engineers in 1937. Boyles summed it up as follows:

1. Primary austenite freezes out in the form of dendrites, which continue to grow down to the eutectic temperature.

2. Crystallization of the eutectic liquid begins at centers which grow equally in all directions, forming a cell-like structure.

3. Segregation takes place in two stages: (*a*) between the primary dendrites and the liquid, (*b*) from the crystallization centers of the eutectic outward into the boundaries of the cells.

4. Constituents formed during the freezing of the eutectic occupy the interstices of the dendrites. The graphite flakes and the phosphide eutectic thus are restricted by the size and distribution of the dendrites.

5. Graphite flakes do not begin to form until the eutectic begins to freeze. As soon as the eutectic is completely frozen, the flake structure essentially is complete. The flakes grow radially from the crystallization centers of the eutectic outward into the surrounding liquid, resulting in a "rosette" or "whorl" formation.

With this clear statement before us, we thought of the method used by Roll to obtain a space model of the graphite flakes. The method consists of firmly establishing the position of the specimen on the stage of the microscope, photographing and repolishing. Between polishings the specimen is measured accurately and when enough plates are obtained they are stacked with the proper spacing between to give a three-dimensional picture. A model can then be constructed of some plastic. Roll seemed to think of the graphite only as flakes, but with Boyles' theory in mind we observed the relative position of the flakes and thus obtained the highly satisfactory confirmation of his theory, shown in Fig. 1. Boyles' word "whorl" appears to be a better description than "rosette."

After constructing the individual flakes, we tried setting them up in their actual space relationships, with the results shown in Fig. 2, which gives views from both sides and the top (standard inch included for scale). The magnification of the models is about 150. These are not all of the formations in this volume but enough are developed to show that the space relationships confirm Boyles' reasoning.

Graphite Accompanied By Expansion

The formation of graphite is accompanied by the expansion. This has been shown by a number of investigators, notably Keep, West, and Turner, and was lately the subject of some very accurate tests by the National Bureau of Standards. Their curves (*Symposium on Cast Iron* 1933, A.S.T.M.) for two bars cast from the same iron are shown in Fig. 5 and are typical of all of them. This phenomenon probably is the reason why cast iron does not have a porous structure, as is commonly supposed. Even Professor Howe passed on this idea, saying: "The presence of this graphite skeleton offers to liquids a path of relatively easy passage."

As just shown in the space model, Fig. 2, the graphite flakes do not completely envelop the grains. Piwowarsky showed (*Die Giesserei*, 1929, p. 838) that cast iron becomes permeable only at a thickness that is governed by the greatest length of graphite flake. He concluded that the flakes do not join each other and that, therefore, if the cast iron is of sufficiently great thickness with respect to the length of flake, there will be no permeability. To prove it he tested three grades of iron with hydrogen at 45 pounds per square inch (3 atmospheres). His criterion of leakage was one cubic inch of hydrogen per square inch per week. The two soft irons, one a pig iron, showed leakage through 0.024 inch but not through 0.030 inch. The high-test cast iron, with its smaller flakes, showed leakage through 0.020-inch but not through 0.024 inch. A test on 0.118-inch (3 millimeters) plates of all three at 2100 pounds per square inch (140 atmospheres) showed no leakage in any of them. From this, he concluded that porosity, as commonly understood, is due to flaws in the casting—never to the metal (*Please turn to page* 154)

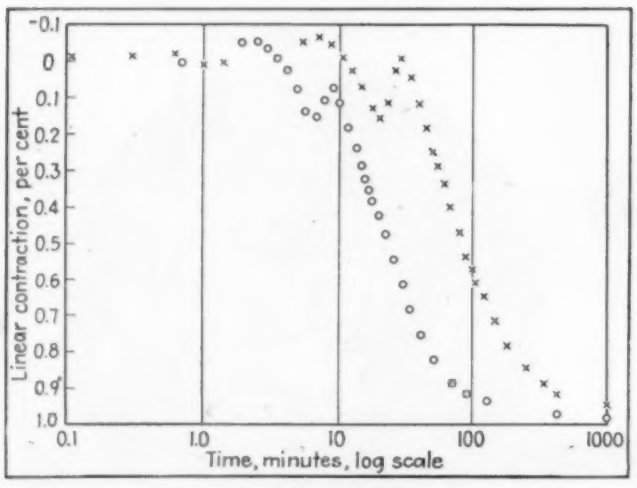
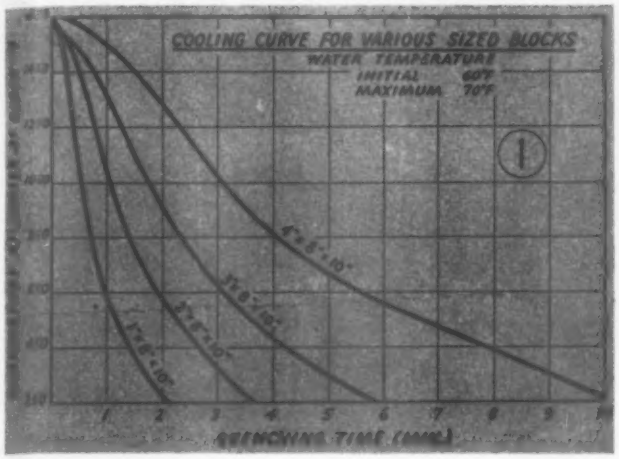


Fig. 5—Relative changes in length in ¾-inch square bar and 1½-inch square bar, each contracting independently

Importance of Design and Mass in Water Quenching Steel Castings



By W. J. PHILLIPS
Assistant to Executive Vice President
Symington-Gould Corp.
New York

Influence of the size and shape of steel castings on practice followed in their water quenching are discussed in this fourth of a series of papers originally presented before the Steel Founders' Society of America.

FUNDAMENTAL metallurgical principles involved in the water quenching of steel castings are no different than those applying to the quenching of any other steel structure when the complete martenization of the cross-sectional area is the aim of such treatment. The requisite factors for a successful quench are, in all cases:

1. Steel of sufficient hardenability for the section size involved.

2. A quenching bath of such capacity and rate of flow that the surface of the piece being quenched approaches the temperature of the quenching medium. A quenching bath of such nature provides the maximum cooling rate possible by establishing the greatest temperature gradient between the center and surface of the quenched part.

3. Removal of the quenched part before its temperature has dropped below about 250 degrees Fahr. The risk of quench cracking is greatly increased if the temperature of the part is allowed to drop much below 250 degrees Fahr. before being tempered.

The foregoing may be expressed generally by stating that a successful quench will result only when the rate of temperature drop of the section exceeds the critical cooling rate of the analysis employed. A further very important point is that the analysis must be such that the *M* or martensite point occurs at a temperature in excess of 250 degrees Fahr.

The manner in which the stated requisites for a successful quench are provided depends entirely on the mass of the sections to be handled. The degree of freedom from quench cracking depends largely on the design of the part. It is most convenient first to discuss the effect of mass alone without the complicating factors of design; this may best be done by the use of specific examples.

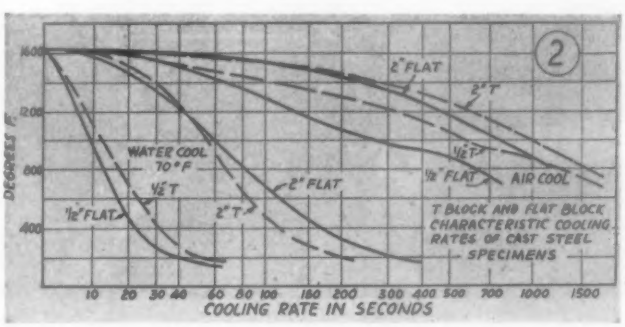
Rectangular blocks 8 inches wide by 10 inches long with thicknesses of 1, 2, 3, and 4 inches, respectively, may be used to illustrate the effect of mass on the factors involved in the water quenching of steel castings. It is at once apparent that the quench-cooling rates of each block will differ widely and that, therefore, the analysis which is suitable for the 1-inch section may be entirely too low in alloying elements to enable the 4-inch section to quench out properly. It is also clear that a certain quench bath capacity and rate of flow of quenching medium may allow a rapid quench for a 1-inch section and be quite insufficient for a heavier section.

Fortunately, the converse is not true. It is an easy matter to select an analysis suitable for the 4-inch section and provide quenching facilities which will allow the complete hardening of

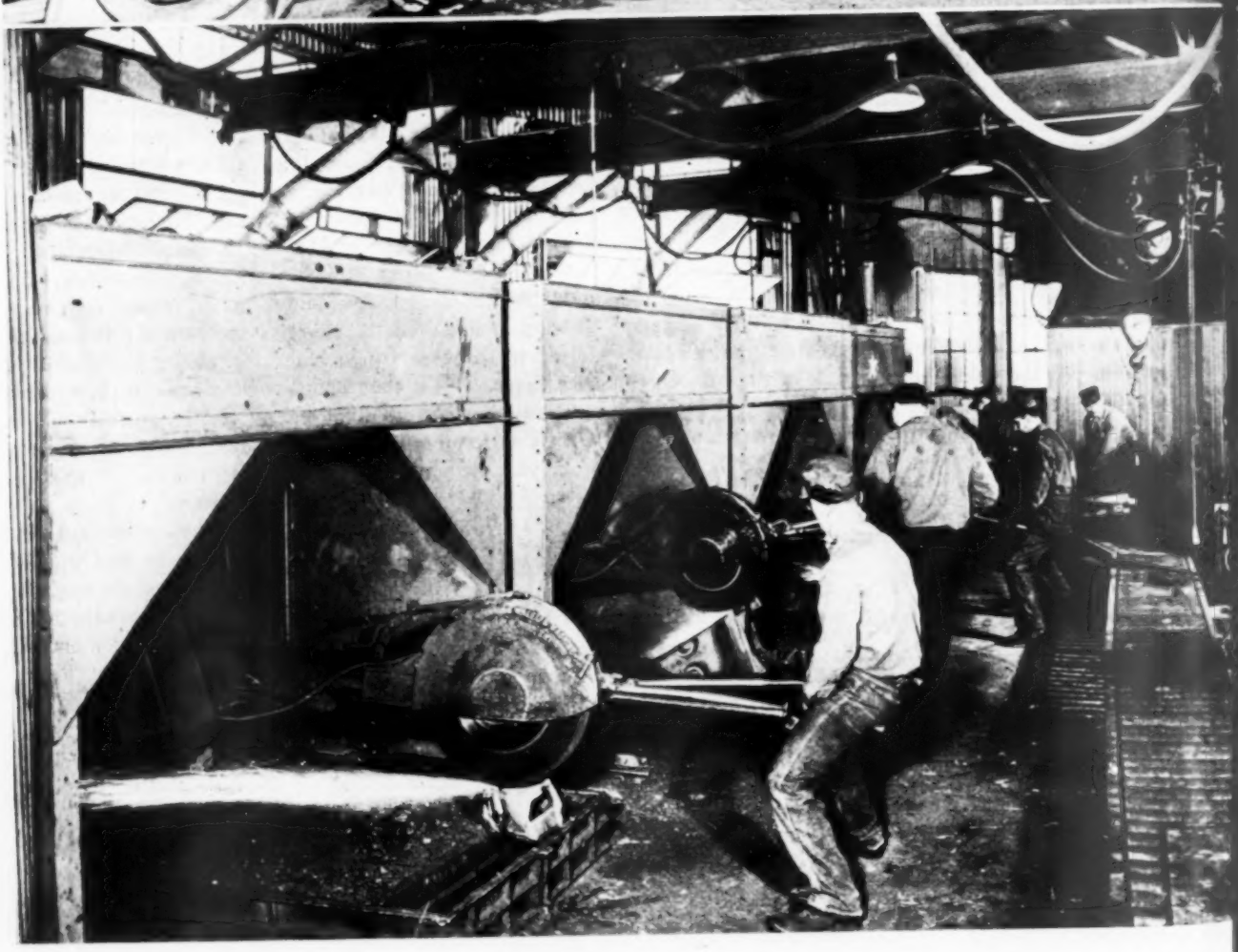
(*Please turn to page* 201)

Fig. 1—Cooling curve for various sized blocks (courtesy American Steel Foundries, Chicago)

Fig. 2—T-block and flat block characteristic cooling rates of cast steel specimens



DUST



By JOHN M. KANE
American Air Filter Co. Inc.
Louisville, Ky.

CONTROL for Swing Frame Grinders

THE swing frame grinder creates more dust than any other type of grinder. Removing from ¼ to 1 pound of metal a minute during contact, the dust load is a combination of large molten particles which make a glowing stream tangential to the wheel and a dense distinctly visible cloud of fine dust floating upward from the grinding station.

Early attempts to control this operation concentrated on local hoods around or near the wheel. In most cases such hoods proved impractical for a number of causes which included:

1. Relatively large diameter flexible exhaust tubing was required which hindered movement of the grinder.

2. A hood surrounding the wheel or located directly in back of the wheel could not be designed that would intercept the path of dust trajectory without interfering with the work. With the high velocity and mass of the heavy particles leaving the grinding wheel, air velocities alone cannot deflect the particles and change their path of travel to the exhaust hood. The escapement of the larger particles induces fine particles to maintain the same path and they too escape the exhaust hood.

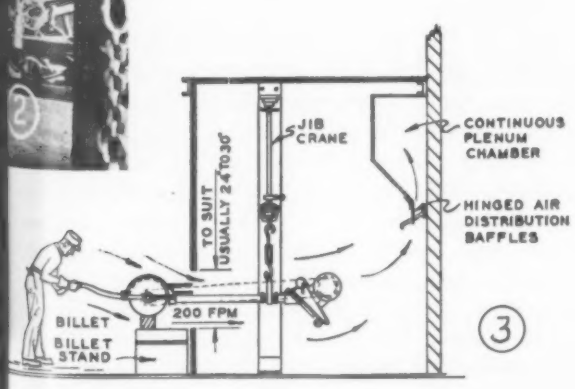
3. Local hoods have been mounted on the grinder frame away from the wheel with the hood mouth in the path of dust travel. Molten particles cool on hitting the hood surfaces and solidify, eventually plugging the exhaust duct with large solidified particles.

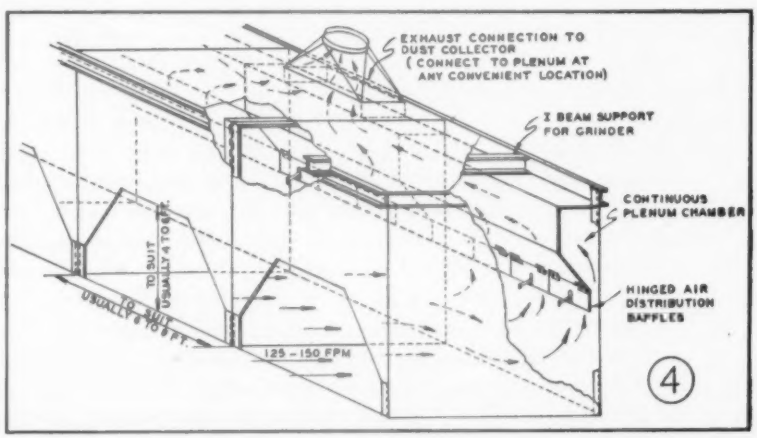
The distance between hood and grinding wheel must be considerable to prevent interference of hood with casting or billet when swing frame grinder is in its forward grinding position. This distance allows the fine dust particles to disperse and escape before getting to the exhaust zone setup by the suction hood.

Even a construction utilizing chains for hood sides (to permit hood location closer to grinding wheel without interfering with work) has not proved effective except in isolated cases.

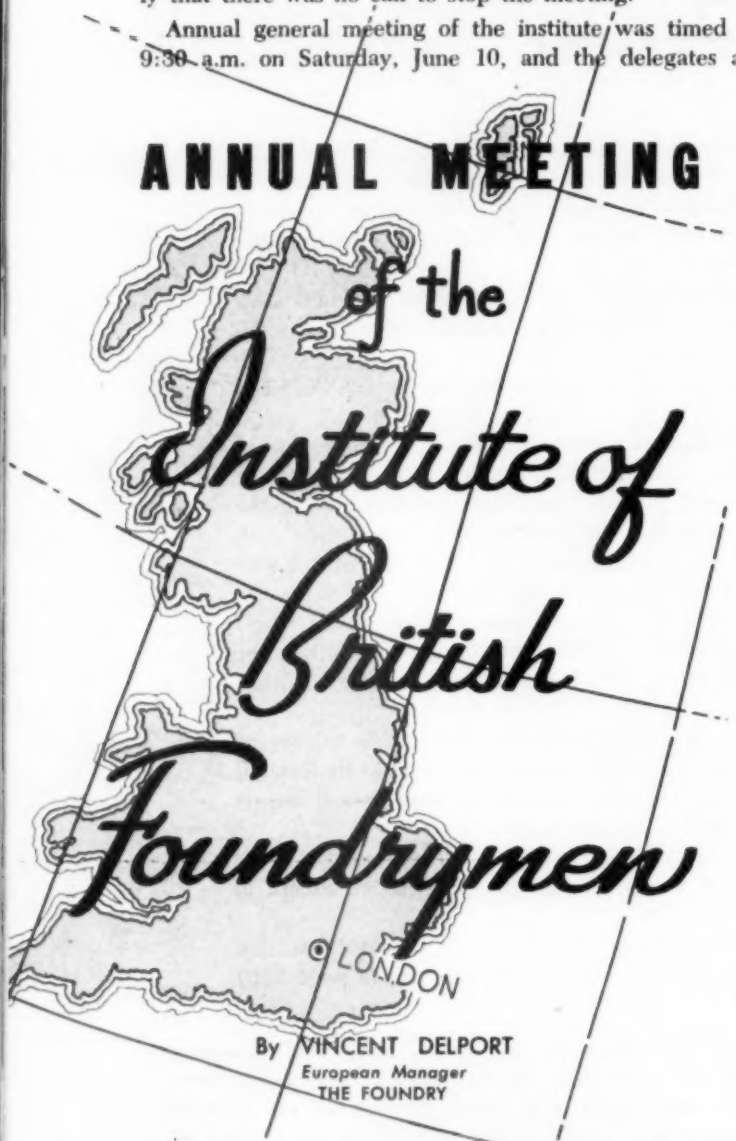
While the booth type hood involves the exhaust of appreciably more air than that required for a pedestal grinder wheel of the same size, its (*Please turn to page* 206)

Fig. 1—Group of eight swing frame grinders in steel foundry. To obtain effective dust control 32,000 cubic feet of air per minute is exhausted. Fig. 2—Separate exhaust ducts are connected to each booth in this installation. Exhauster and dust collector are located outside. Fig. 3—For billet grinding opening in booth front can be reduced. Fig. 4—Construction details and design features of swing frame grinder booths. Various advantages are claimed for the plenum chamber in back of booth




EXHAUST CONNECTION TO DUST COLLECTOR (CONNECT TO PLENUM AT ANY CONVENIENT LOCATION)
I BEAM SUPPORT FOR GRINDER
CONTINUOUS PLENUM CHAMBER
HINGED AIR DISTRIBUTION BAFFLES
125 - 150 FPM
4

ANNUAL MEETING of the Institute of British Foundrymen



By VINCENT DELPORT
European Manager
THE FOUNDRY

FORTY-FIRST annual general meeting and convention of the Institute of British Foundrymen was held in Manchester, England, on June 9 and 10, and was very well attended despite the fact that it took place during "invasion week". The organizers obviously were prepared to cancel the meeting if it had been necessary to do so in order not to interfere with the war effort, but invasion preparations had been so complete and ran so smoothly that there was no call to stop the meeting.

Annual general meeting of the institute was timed at 9:30 a.m. on Saturday, June 10, and the delegates assembled in the conference room of the Midland Hotel, with Daniel Sharpe, director, Walter Macfarlane & Co. Ltd., Glasgow, in the chair. In presenting the annual report the president pointed out that membership of the institute had continued its upward trend, having reached 2946 as at April 30; new members received since that date had brought the membership roll well over 3000. Despite war conditions the 12 branches of the institute had held many meetings throughout the year, at which numerous papers had been discussed. The Education Committee had published a valuable report embodying a scheme for the education of young people from the time of leaving school so that they would have opportunity for training and reaching the highest posts in the industry. The Technical Council had been reorganized with a view to giving increasingly valuable services to the institute.

Following the adoption of the report and balance sheet, the president announced the awards for the year 1944. Recipient of the Oliver Stubbs Gold Medal was W. Y. Buchanan, foundry manager, John Lang & Sons Ltd., Glasgow, for the many important papers he had presented to the institute, particularly in connection with sand testing and the properties of molding sand. Mr. Buchanan is a member of the Sands Sub-Committee of the institute, he has been active for many years on the council of the Scottish branch, and recently was elected to the council of the institute.

The E. J. Fox Gold Medal was awarded to FitzHerbert Wright, director, Butterley Co. Ltd.; director, L. N. E. Railway Co.; vice president of the British Cast Iron Research Association, and recently appointed on the departmental committee of the Board of Education to consider higher education in industry in conjunction with the universities and technical colleges.

Mr. Wright received the award for his valuable contribution to the progress of the ironfoundry industry in initiating and organizing the Council of Ironfoundry Associations of which he has been chairman since its foundation in September, 1941. The medal was presented by E. J. Fox, past chairman, Stanton Ironworks Co., Ltd. In replying, Mr. Wright said that the ironfoundry industry had a tremendous part to play after the war; it now was organized better than it had ever been and was no more looked upon by the authorities as a Cinderella industry. He expressed the thought that a better organization of industry generally would help in avoiding future wars, especially if industrialists agreed together to improve working conditions, and if such problems were tackled internationally.

Award the First Foundry Medal

First award of the British Foundry Medal, a gift from H. Barrington Hooper, managing director, Industrial Newspapers Ltd., and the *Foundry Trade Journal*, was made to Jack Gardom for his paper on "The Mass Production of a Manganese Steel Casting," which was the institute's exchange paper to the American Foundrymen's Association in 1943. Mr. Gardom has been convener of the Technical Committee for 12 years and relinquished his post only this year. He was president elect of the institute. The cash prize that is awarded in conjunction with the British Foundry Medal went to E. Longden, foundry manager, Craven Brothers (Manchester) Ltd., for his paper on "Fluid Pressure in Foundry Practice" given before the Lancashire branch in 1943.

The following members were awarded diplomas for the best papers presented during the year:

Ian Ross, for "Magnesium Foundry Technique", presented to the London Branch; R. C. Tucker, for "Cupola Operation and Control", presented to the East Midlands Branch; A. Wood, for "A Small Molding Unit", presented to the Birmingham Branch; M. R. Hinchliffe, for "An Outline of Gravity Die Casting", presented to the Scottish Branch, and J. Blakiston, for "Mechanical Aids to Core Production", presented to the East Midlands Branch.

The meeting then proceeded to the election of officers for the ensuing year. J. Gardom, foundry consultant, Ripley, unanimously was elected president. D. H. Wood, managing director, Construc- (*Please turn to page* 214)

DURING the 47th annual meeting of the American Society for Testing Materials held in the Waldorf Astoria, New York, June 26 to 30, both producers and users of castings spent considerable time in both committee meetings and in regular sessions on the problems of specifications of castings. Looking ahead to the time when industry will reconvert to peacetime production, consideration was given to the revamping of existing specifications, the disposal of certain emergency specifications, and the development of new specifications and methods of testing. The annual meeting broke all attendance records with a total registration of 2000. Attendance of men engaged in the production of castings probably was larger than usual.

Of particular interest to foundrymen was the round-table discussion on centrifugal castings held jointly with the American Foundrymen's Association. Norman L. Mochel, Westinghouse Electric & Mfg. Co., Philadelphia, presided, and talks were made by Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.; T. S. Quinn, Lebanon Steel Foundry, Lebanon, Pa.; John Howe Hall, General Steel Casting Corp., Eddystone, Pa.; Col. H. Zornig, Watertown Arsenal, Watertown, Mass.; Dr. E. A. Schuh, United States Pipe & Foundry Co., Burlington, N. J., and C. V. Nass, foundry division, Pettibone Mulliken Corp., Chicago.

While the various speakers covered the subject from different angles, in the main all seemed to agree that some claims for centrifugal castings may have been exaggerated and that where it is possible to produce sound castings statically, the product should be as good as the casting produced by the centrifugal process; that the castings must be designed to accommodate the centrifugal process if satisfactory results are to be obtained; and that there is no reason why the A.S.T.M. should set up new specifications to apply to centrifugal castings since those already in existence cover the field satisfactorily. However, it was pointed out that perhaps new tests may be required.

Process Is Applied to Many Metals

Dr. MacKenzie outlined some of the work that has been done by his organization in casting iron in the form of centrifugal pipe and steel in a variety of sizes and shapes. He pointed out that all metal may be cast centrifugally with the possible exception of magnesium. His own company utilizes a wide variety of ferrous alloys. Dr. MacKenzie outlined some of the problems which develop in casting metals centrifugally, discussed the wave phenomena produced by the action of the metal moving down a mold, and indicated the value of the magnaflux and radiographic methods of testing.

Mr. Quinn discussed the problem of centrifugal castings using green sand, dry sand, and chamotte. He indicated the necessity of special studies on mold and core washes to prevent washing of the mold. He outlined the practice followed by his organization in producing centrifugal castings on a vertical axis in which the entire casting is produced in the mold. He showed an interesting example which required great care in producing and which it was indicated could not have been poured satisfactorily by the static method. However, he pointed out that his company prefers to produce castings statically wherever it is possible to do so satisfactorily. To spin a mold that can be made satisfactorily by the static method only complicates the shop production problem and increases costs. Mr. Quinn pointed out that the mold should be spun only fast enough to provide satisfactory feeding of the thin sections and indicated that directional solidification is somewhat enhanced by the centrifugal process. While claims have been made for a saving in yield through the centrifugal process, his own experience showed that this was not a factor in the jobbing foundry. He also stated that the cost of rigging for casting small runs centrifugally is a problem for the jobbing shop.

Mr. Hall indicated that making heavier castings centrifugally provides plenty of fun and trouble. He outlined the three methods, consisting of the true centrifugal; casting on a vertical axis entirely in a mold, and centrifuging where a group of castings are placed in a mold for spinning about a central axis. Mr. Hall stressed the fact that, contrary to certain statements which have been made, no action similar to forging takes place in the centrifugal mold. He stated that as long as steel is in the liquid state it cannot be forged and that centrifugal action simply puts a pressure on the metal. In centrifugal pouring, when the mold once has been filled and full speed reached, there is no motion of metal in the mold. It lies perfectly quiet and solidifies in the same manner as in a static mold.

With the true centrifugal process, cooling chiefly is from the outside in, but if the metal is too thick cooling takes place from both inside and outside of the casting and cracks result. Mr. Hall stressed the point that it is important to secure controlled directional solidification and that the design must be such as to avoid adjoining light and thin sections. He stated that centrifugal pressure will not be sufficient to force metal through thin sections to reach thicker sections.

Colonel Zornig discussed the (*Please turn to page* 220)

Specifications by A·S·T·M

Annual meeting of the American Society for Testing Materials held recently in New York devoted considerable time to specifications for castings, various changes in which will be required when industry returns to peacetime production. No new specifications seen needed for centrifugal castings.

QUESTIONS and ANSWERS

Casting Brass in Metal Molds

Q.—What is the advisability or feasibility of casting brass port light frames 10 to 16 inches diameter in permanent molds. We might get an order for approximately 2000, but the price has been kicked around considerably and it would not pay to mold them by hand. We have no molding machines. Do you think the shrinkage would cause the casting to crack in an iron mold?

A.—An answer to your recent inquiry about making brass port light frames in a permanent mold falls into the yes and no pocket. The casting *can* be made in a permanent mold, but we doubt if you would get a mold at present, at least in any reasonable time. In the second place the mold or molds would cost so much that you would make nothing, or less than nothing on a 2000 order. In the third place the molds would be scrap after the job was finished.

A plain, two piece mold would not serve. As you point out, the lugs and general shape would cause the casting to crack. Therefore, the mold would have to be constructed in a manner that would permit a stripping of various parts before the casting began to contract. If you design the mold yourself and have it built in a local machine shop, you inevitably will have to go through a long, expensive, experimental period before the mold will function satisfactorily. In our opinion the best solution of your problem is to get a squeeze type molding machine which will serve for other jobs after the ring order is finished. Incidentally, a little missionary work among the price-kick-arounders, might result in benefit to all concerned.

Igniting Mold and Core Vents

Q.—What is the reason for lighting the vent from a mold or core? Does the gas flow more freely when it is lighted?

A.—The general belief that gas flows more freely when it is lighted was widely held among foundrymen of a former generation. Traces of this belief occasionally are found today among men who served their time in the old rule of thumb era at or before the time science timidly made its appearance in the foundry arena. Investigation conducted by various delvers for the truth have proved conclusively that the gas from a mold or core flows with equal velocity either in the lighted or unlighted state. Detailed description of a series of experiments on this subject by A. J. Cassista was presented in the June, 1937 issue of THE FOUNDRY.

With the exception of clay and cement, all the binders used in core sand mixtures are combustible. In contact with, or nearly surrounded by molten metal, the core is raised to a high temperature. The binder material is converted to gas which escapes through the vent passage or passages in great volume. In some instances this gas is at a temperature which causes it to burst into flame. In other instances—and these probably are in the majority—the gas emerges in the form of smoke with a very acrid, penetrating and disagreeable odor. Application of a hot skimmer, piece of scrap, torch, handful of oily waste or shavings, causes the smoke to burst into flame with consequent elimination of the smoke and smell.

In large hollow cores, or cores in which a comparatively thin coating of green sand or loam is swept on to a cast iron or steel barrel, the vent must be lighted immediately after it commences oozing through the vent openings. If allowed to accumulate it unites with the air and forms a highly explosive mixture, bound to be touched off by a falling spark or splash of metal. With little or no artificial binder in molding sand and with most of the gas coming from the coal dust in the facing, the necessity of lighting the vent is not a factor of any importance. However, there is one important exception to that statement. Where the escaping gas is confined, as for example under a bottom board, it must be lighted—as with the hollow core—otherwise it will develop into an explosive mixture.

Determining Cleaning Costs

Q.—We recently have been considering changing our method of arriving at foundry cleaning costs and also the method to be used in charging those costs to production. Before we take any steps in that direction, we will appreciate any information in regard to the problem.

A.—Matter of cleaning costs in both ferrous and nonferrous foundries has been much abused, and too often the average tonnage cost for all types of cleaning is employed, rather than taking the time to analyze the cost element for each job. Generally speaking there are two methods of cleaning castings which can be classified as barrel cleaning, and as grinding, chipping, brushing and table blasting. There are two separate conditions of barrel cleaning. In some instances it is possible and practical to load the barrel with one kind of casting. In that case the time that the castings are in the barrel can be measured and the cost of operating the barrel per hour obtained. That figure applied on the measured time will result in an accurate and usable cost of cleaning.

On the other hand it may be necessary to throw diversified castings into the barrel at the same time which does not permit accurate timing, and in such cases, it is most practical to treat the cost on a tonnage basis. In all instances procedure must be tempered to fit existing conditions. We recommend the timing of separate jobs for grinding, chipping, brushing and table blasting; charging to each job the direct labor costs involved, and applying a departmental overhead for that department, based upon the production hours taken for each separate job.

On occasion that procedure can be simplified by timing a representative number of castings on a single job, thus establishing a standard time for performing this operation. That standard multiplied by the number of castings cleaned establishes a basis for costing. Such a method is

particularly advantageous where a variety of castings from the molding floors are delivered to the cleaning room men in a single pile, and they pick them up and clean them in no particular order. The problem of labor cost distribution to jobs should not be difficult to accomplish. However it might be well for you to give more thought to the matter of establishing an overhead (burden) rate to be applied to the various jobs flowing through the cleaning department.

This should not be a difficult task if you analyze the overhead expenses of your business and include that portion of them caused by the operation of the cleaning department. Dividing the total cost obtained by the operating hours for the same period covered by those costs will give the cost per hour which can be applied to the time required to produce each lot of castings cleaned. Principal expense elements in cleaning are depreciation, property taxes, property insurance, repairs, supplies, supervision, indirect labor, taxes and insurance on labor, and a proportionate share of the maintenance of office facilities and personnel.

Discuss Ferrous Alloy Growth

Q.—We would like to know if cast steel or malleable iron will continue to grow if heated repeatedly to 1350 degrees Fahr., and if not when the growth ceases. Also can you give comparisons on the growth between cast iron, cast steel and malleable under the conditions previously stated? We are referring to ordinary cast steel and malleable without any special alloys such as chromium, and to cast iron such as is termed stoveplate.

A.—Ordinary cast steel or malleable iron will not grow if heated repeatedly to 1350 degrees Fahr. and cooled slowly. You do not indicate how the metals are to be cooled from the maximum temperature. If high carbon steel is heated above its hardening temperature, which is in the neighborhood of 1350 degrees Fahr., and quenched in water a number of times, it will grow somewhat shorter, and will bulge out at mid-length, but we do not believe that is what you have in mind.

The effect on malleable iron, too, of repeated heatings to 1350 degrees will depend upon whether it is cooled slowly or quenched. If the latter, there will be a tendency for some of the temper carbon to re-absorb and be fixed as pearlite, changing the character of the metal somewhat. But again that is probably not what you are referring to.

Ordinary gray iron grows on repeated heatings to red heat. The growth will proceed a good deal faster at temperatures above 1350 degrees Fahr., but even at that temperature, the growth will be steady and continuous. It is due to the penetration of oxygen into the metal along the graphite flakes, and the resultant oxidation of the matrix to oxide. The end result is that the iron becomes very weak and crumbly, and eventually will almost fall apart.

You do not mention whether the metal is to be under stress when heated repeatedly, and if so, that will change the story completely. We wonder if you are thinking of what is termed "creep" of metals when loaded at red heat or below. Under sufficient stress—and not very high at that—with the metal at 1350 degrees Fahr., steel and other metals stretch continuously, and finally break under the load. The total length of time to produce rupture, of course, depends upon the temperature and stress imposed. At such high service temperatures, comparatively speaking, engineers know that their structures will not last indefinitely, but are good for so many thousand hours service. The specifications for metals for high temperature service call for a maximum "creep" rate at any given temperature and load which will guarantee that the part will last the desired length of time.

Stirring Rods May Dissolve

Q.—Years ago we used dry hickory sticks to stir and skim our nonferrous alloys, and then went to Swedish iron. However, that is off the market and we have been using mild steel, but we believe there is an iron pick-up with those bars. We are wondering if a heat resistant skimmer has been developed. We did try graphite rods made especially for the purpose, but they proved too fragile to stir the contents of our No. 400 tilting crucible furnace. We also have tried putting a refractory coating on the steel rods, but the refractory kept flaking off, and we soon were down to the bare rod.

A.—So far as we can see you have covered all the possibilities for stirring and skimming rods. There is no doubt that the graphite rods will give the least contamination of the melt, and it appears that you should secure one much heavier than ordinarily available for stirring and skimming smaller pots. Have you asked your source of supply whether a sturdier rod is available? Many foundries are using iron or steel rods for stirring and skimming. Some coat the rods and others do not bother. Mainly they watch to see that the rod is not kept in the metal too long. The hotter the rod becomes, the more easily it will dissolve in the molten metal. Hence, if you will have several stirring rods handy, you can keep changing them sufficiently to prevent too great an increase in temperature.

GANGWAY!

By J. A. Patterson

"I don't give a hoot if you are mad with him—quit your pouting and turn around."

Chill Fuses to Car Wheel Casting

Q.—Occasionally we make a few chilled car wheels weighing 115 to 175 pounds, and have trouble with the metal not laying on the chills. We pour the wheels through a 2-inch gate on the hub, and as hot and as fast as possible. Molds are dry sand, and chills are about 3 inches thick and 4 inches deep. Last ones we cast we cleaned the chills with oil, rubbed graphite and oil on them, and put the chills into the oven to be heated up. Chills were placed in the mold just hot enough to handle, and allowed to remain in the open mold until just warm. Wheels were poured with iron at 2680 degrees Fahr., and they fused to the chill which never happened before. Chills are made with 35 per cent steel scrap charge and 1.50 per cent silicon content. Wheel iron contains 10 per cent scrap, and 2 per cent silicon.

A.—Your description indicates that the chill fused to the wheels due to high temperature of the iron with the chill being hotter than you thought. Possibly the fusing may be due to the gate arrangement permitting considerable iron to flow over one section of the chill. Your practice of using a dry sand mold and loose chill differs considerably from the usual method of making car wheels which employs green sand with the chill as part of the drag. With a dry sand mold there should be no need to heat the chill since there is no moisture to condense upon it.

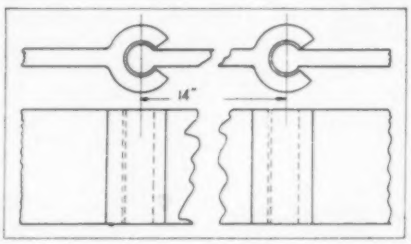
Main essential in using chills is that the latter be clean and dry, and the coating you applied should work satisfactorily although firms specializing in car wheels generally use a proprietary chill coating material. Why not try giving the chills a light abrasive blasting to insure cleanliness, and pour without any heating or coating to see what happens. Also try pouring at a lower temperature. In gating use a cap core over the center core to form a basin with 3 or 4 slot gates equally spaced to feed the metal along the side of the center core into the hub, and spokes or web as the case may be. That will give uniform distribution of the metal.

Curbing Is Used To Reinforce Molds

Q.—What is curbing and how is it used in the foundry? We work in a light gray iron shop where apparently the term or the device is unknown.

A.—In foundry nomenclature, curbing is the term employed to designate a piece of equipment, cast iron or rolled steel plate, either a single unit or in sections that may be united, to serve as reinforcement around a complete mold, or a mold in which part is not enclosed in a flask. It is used to some extent in many types of foundries, but principally in foundries where loam molding is practiced and where the mold projects above the floor level. Even in the light gray iron foundry, the metal band which fits inside the snap flask and tightly embraces the sand when the flask is removed, may be regarded as curbing. Its function is identical with that of larger and more substantial pieces of equipment.

A rolled steel plate either in one piece, or in sections bent to any convenient radius is provided with punched holes along the ends for the reception of bolts when the ring is set to the desired size to embrace the mold and a thickness of rammed sand between curbing and mold. Cast iron curbing, usually in sections 12 x 14 inches, 1 to 1½ inches in thickness and weighing 40 to 50 pounds, is provided with some form of locking device at each end. The form shown in the



Cast Iron Curbing Is Self Locking

accompanying illustration is fairly typical. In another form the ends are provided with staggered lugs which fit together like the pin type hinges on a door. A steel pin is dropped through the lugs to hold the sections together. Of course the number of sections required will vary with the size of the mold to be enclosed.

Cupola Bottom Does Not Drop Clean

Q.—How can we get a good, clean drop on our cupola at the end of a 4-hour heat? During the last hour the melting speed is reduced, but the temperature of the metal remains quite satisfactory. We get an excessive hang-up when the bottom is dropped.

A.—This inquiry might refer to either one of two conditions: 1—The sand bottom does not drop quickly when the prop is knocked from under the bottom doors, or 2—An excessive amount of material clings to the lining of the cupola when the bottom is dropped. The first condition results from ramming a strongly bonded sand in the bottom. Heat from the molten iron bakes the sand into a hard compact mass which holds its shape for some time after the supporting doors have been released. In extreme instances it is necessary to break through it with a bar. The obvious remedy of course is to use a sand with less bond.

The second condition, an excessive amount of material clinging to the cupola lining, may be due to one or to a combination of two or more factors. Ash from the coke combines with the limestone, sand and part of the brick lining to form a slag which drops with the molten iron toward the well of the cupola. The iron goes through, but some of the slag comes into contact with the cold blast rushing in at the tuyeres and solidifies. Gradually this solidified ring of material extends further and further into the cupola and forms a bridge. Eventually it closes all the way across and prevents any further melting. The principal cause of this condition is a blast that is too great in volume and pressure. The second principal cause is a method of operation in which a proper balance is not maintained between the volume of air and the weight of the iron and coke charges. Where a clean drop is wanted on a long heat, the iron charges should be held to a minimum rather than to a maximum amount. The smaller charges melt and move more rapidly through the cupola and thus prevent this tendency toward forming a bridge.

How To Patch Cupola Melting Zone

Q.—We patch the melting zone in the cupola with brick and a good mixture of fire clay and fire sand, but it burns away to an excessive extent. We shall appreciate advice on good patching procedure.

A.—Method of application is as important and in some instances more important than the composition of the daubing material. The mud should not be much over 1-inch in thickness. Where the lining is burned away to a depth of 2 inches or more, it should be repaired with split bricks or thin stone slabs set in a mud foundation just thick enough to hold them in place. If a thick mud lining could be dried slowly and thoroughly, it would stay in place. However, that condition rarely prevails in the average operation.

The blast is put on before the daubing is properly dried. The resulting intense heat sears the face and drives some of the moisture to the back to form a slippery connection. The descending stock creates friction and between the two causes, the daubing material sloughs off and leaves the originally burned part of the wall exposed. In many instances an otherwise perfectly satisfactory daubing material contains too much water, and cannot possibly become dried in the brief period between makeup and blast on. Only enough water should be incorporated in the mixture to render it workable and enable it to stick to the brick wall.

In a typical poor mixture instance the material contained 2 parts foundry sand and 1 part fire clay. The fire clay had a softening point of 3325 degrees Fahr. and the sand only 1900 degrees. The softening point of the combination was approximately 2500 degrees. Since the temperature in the cupola was approximately 2900 degrees, the patching material melted and slid down carrying the split bricks with it. Changing the mixture to 2 parts old molding sand, 2 parts crushed fire brick bats, 1 part fire clay and 8 per cent water, increased the active life of the lining to a remarkable extent.

ON THE MARCH
to aid Foundrymen...

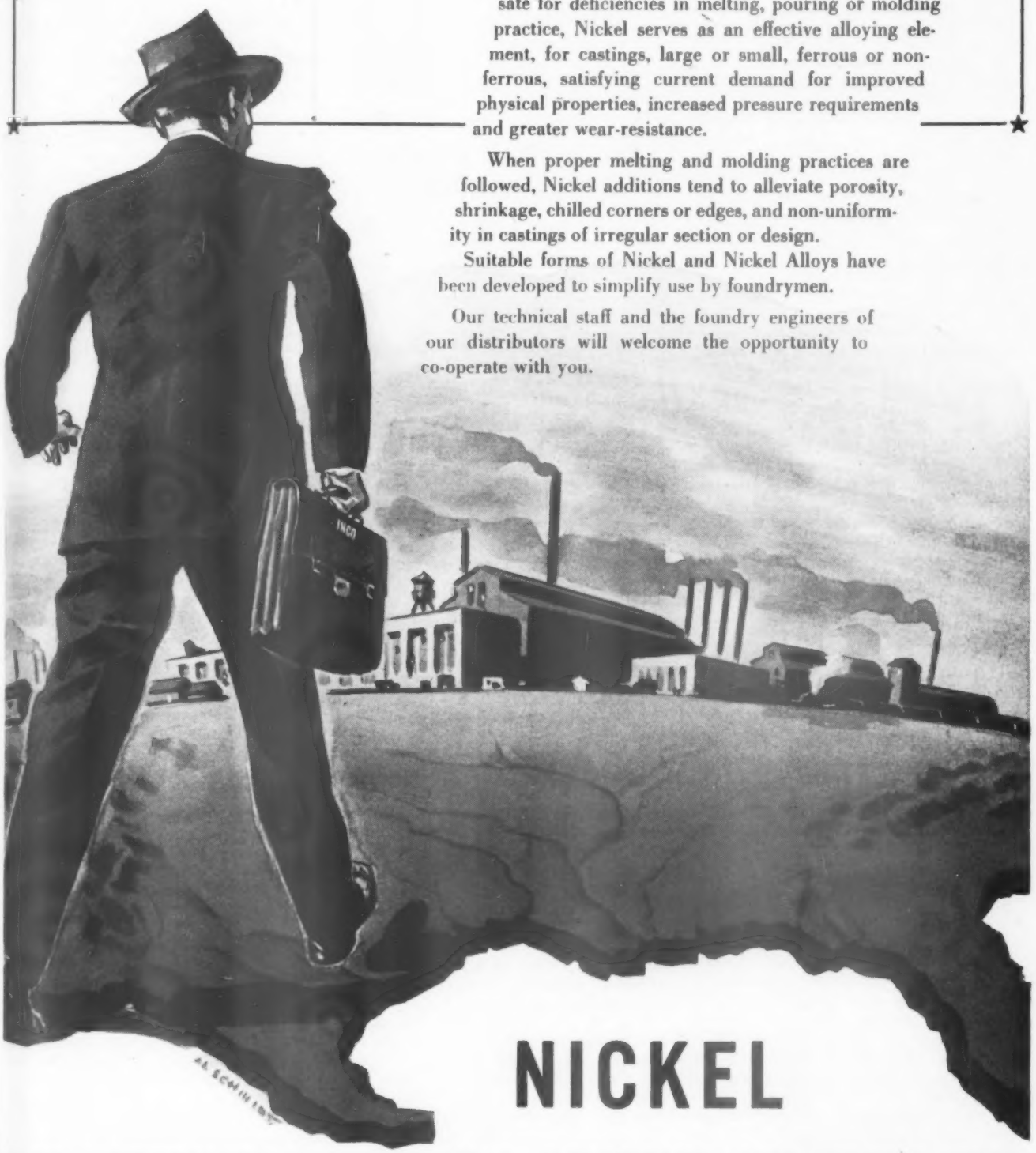
NICKEL FIELD REPRESENTATIVES are always "on the go." By reason of training and experience they are equipped to offer timely assistance on foundry problems.

While not a "cure-all" in that it will not compensate for deficiencies in melting, pouring or molding practice, Nickel serves as an effective alloying element, for castings, large or small, ferrous or non-ferrous, satisfying current demand for improved physical properties, increased pressure requirements and greater wear-resistance.

When proper melting and molding practices are followed, Nickel additions tend to alleviate porosity, shrinkage, chilled corners or edges, and non-uniformity in castings of irregular section or design.

Suitable forms of Nickel and Nickel Alloys have been developed to simplify use by foundrymen.

Our technical staff and the foundry engineers of our distributors will welcome the opportunity to co-operate with you.



NICKEL

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Make Pressure Cast Matchplates

Q.—Can you give us any information on the method for making pressure-cast aluminum matchplates in plaster molds?

A.—You do not mention whether you are familiar with the manufacture of plaster molds, and if not we suggest a careful study of an article entitled, "Casting in Plaster Molds" which appeared in the March, 1944 issue. Briefly, the process consists of covering the well-oiled pattern, mounted in a frame or flask, with liquid plaster, and allowing it to set for about one-half hour. Then the pattern is removed and the mold dried in an oven at a temperature from 600 to 1300 degrees Fahr. for 2½ to 10 hours; the longer time being required for the lower temperature. Mold is allowed to cool to about 300 degrees before removing from oven to prevent cracking.

To obtain a greater head or pressure of metal, pouring sleeves are used with and without additional air pressure. The sleeve may be an iron pipe lined with plaster, a plaster tube, or a tube made of core sand or other refractory material. For matchplate work the tube or sleeve is about 24 inches long. If it is desired, the end of the sleeve is arranged for attaching a cap to which air pressure of 60 to 80 pounds per square inch may be applied. In use, the end of the sleeve which fits into the mold is closed with a thin disk of asbestos paper. Then the sleeve is filled with molten metal, and immediately the asbestos disk is pierced with a rod to allow the metal to fill the mold cavity. If air pressure is used, the disk need not be pierced as the force of the air on the metal will perform that operation.

Iron Is Picked Up by Aluminum Alloy

Q.—We are melting our aluminum alloys in iron pots, and are having trouble with iron pick-up. The alloy as purchased contains 0.5 per cent iron, and appears to absorb 0.3 per cent more from the pot during melting. We have tried using whiting and waterglass for coating the pot, but it does not give satisfactory results.

A.—Evidently something is wrong in your procedure since iron pots for melting are widely used without encountering excessive pick-up of iron by the aluminum alloy. Consequently, it might be wise to look into the composition of the wash and more particularly to the method of coating. One type of coating used to a considerable extent is composed of 7 pounds of whiting suspended in a gallon of water with or without the addition of a small amount of sodium silicate or water glass. In Europe a mixture composed of 50 per cent high grade fireclay, 45 per cent water and 5 per cent sodium silicate is used.

Previous to applying the coating, the pot should be cleaned carefully to remove all scale and dross adhering to the wall. The pot should then be heated to a temperature above that of boiling water, but not too hot, and the coating brushed on. Due to the elevated temperature of the pot, the coating will dry rapidly. Do not apply too thick a coating as it will tend to crack and flake off.

Also it might be well to watch the melting temperature, and see that the aluminum does not get too hot since the higher the temperature, the more rapid is the iron pick-up. You do not mention the limitation on iron content of castings made from the alloy, but if it is close to the 0.5 per cent figure you mention, it might be advisable to use graphite or silicon carbide crucibles instead of iron pots.

Cupola Can Be Used For Bronze Melting

Q.—As we have a problem that is a little out of the ordinary, we would like to have some advice from you. We have seven bronze castings to make of which three weigh 550 pounds each, and four weigh about 450 pounds each. Our melting unit holds only about 160 pounds, and we wonder if we could melt the metal in our cupola, which is lined to 24 inches, with coke as the fuel. We can handle only one casting at a time due to limited crane facilities. In melting will it be better to charge the whole amount at once or in separate lots for each casting? Also what about the wind pressure if any?

A.—Since large quantities of bronze have been melted in the cupola with ordinary coke to meet emergency cases, there is no reason why you cannot do it also. First you will have to chip out the cupola carefully to get rid of any iron or iron slags on the walls, and then patch it as you would for melting iron. You will not need nearly as high a blast as used for iron, and if you do not have a gate in the blast pipe, one should be installed to reduce the amount of air going into the cupola.

With your 24-inch cupola the bed should be built up to about 36 inches. The metal charges may range from 400 to 450 pounds each with coke splits weighing about 20 to 25 pounds between charges. Melting rate will be around 4000 to 6000 pounds per hour, but can be controlled to some extent by regulating the amount of air blast admitted, and we suggest that you adjust the blast gate so that about 18,000 to 20,000 cubic feet of air per hour are admitted. Pressure should be only a few ounces.

You do not mention what raw materials you are going to use—that is whether it is alloy ingot or copper, zinc, tin, etc. If it is copper to which the other elements are to be added, melt only the copper in the cupola, and add the white metals in the ladle. If you are going to use composition ingot, you will have to add some zinc and lead since they will be oxidized during melting. Figure on about 15 per cent loss in lead and 50 per cent loss in zinc.

Also you might be interested in reading the practice employed in a Pacific Coast foundry in melting bronze in the cupola which appeared in the July, 1944 issue on page 89.

Figuring Percentage Of Steel Scrap

Q.—How do you determine the percentage of steel scrap to be used in the cupola charge for heavy machine castings?

A.—Steel is added to the cupola charge for the single purpose of increasing the strength of the resulting metal. In ordinary nontechnical language this means a reduction in the grain size and consequently a closer, denser structure. To approach the problem intelligently the foundryman must know in advance the degree of strength required in the casting. He also must be familiar with the approximate analysis of metal in this strength range and make due allowance for thickness of section. Type of mold into which the metal is poured, green or dry sand; tapping and pouring temperature; available materials in the yard to make up the other component parts of the charge, possibility of adding ferro-alloys or other agents at the spout or in the ladle, all constitute variables which must be taken into consideration when deciding on the percentage of steel in the cupola charge.

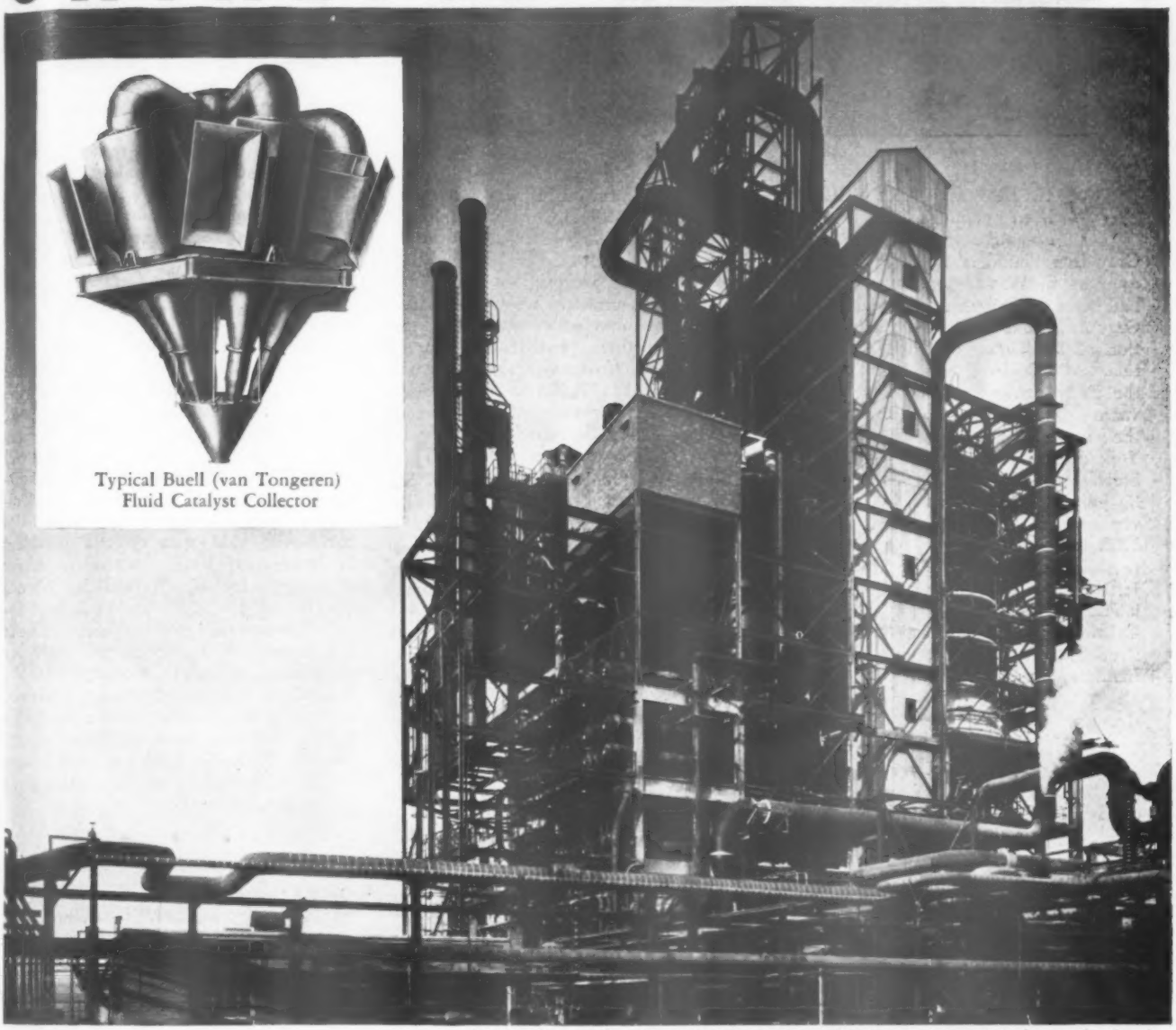
From the foregoing it readily is apparent that no hard and fast rule can be laid down that will apply under all conditions. While it is true that the average amount of steel in the cupola charge for heavy machine castings requiring a tensile strength of 40,000 pounds per square inch, is 35 to 40 per cent, that does not mean that 35 per cent steel added to any kind of a mixture in the cupola charge will produce metal showing 40,000 pounds per square inch tensile strength. The calculated analysis of iron at the spout must be kept within recognized limits. Obviously this requires a considerable degree of background and knowledge on the part of the operator.

Oily Scrap Melted In the Cupola

Q.—We shall appreciate your opinion on the following disputed point: *A* claims that if oily or greasy scrap is charged into the cupola, it will affect adversely the resulting metal. He claims the oil or grease should be removed by burning before the scrap is placed in the cupola. *B* claims the foregoing view is nonsensical, and that no problem exists for the simple reason that oil or grease on the scrap is burned off long before the iron reaches the melting zone.

A.—This is one of the comparatively small number of questions that may be answered by a direct yes or no, and without any guessing or theorizing on the probable omission of certain factors. Briefly, then, A is mistaken in his contention and *B* is right.

CATALYST RECOVERY



Typical Buell (van Tongeren) Fluid Catalyst Collector

Fluid catalyst cracking plant for 100-octane gasoline in one of America's large oil refineries.

Saving the Catalyst in High Octane Gas Production

• THE ABOVE ILLUSTRATION shows the plant of a large oil company, which is typical of the catalytic cracking plants used in the making of 100-octane gas. In this plant the fluid cracking process is employed.

An important part of the process is the Buell (van Tongeren) Catalyst Collector. Both the plant and the collector are representative of the type which have been installed in a number of oil companies making possible the production in tremendous quantities of gasoline required by the war program. Catalytic cracking is but one of the developments which point up the ingenuity and scientific progress of the American oil industry and by which high production of 100-octane gas has been possible.

Further, here is the strongest of indications of Buell's high efficiency and wide application. In designing and building over two-thirds of the nation's fluid cat-cracking capacity . . . The M. W. Kellogg Company has installed Buell catalyst recovery systems throughout.

Again, Buell has demonstrated its ability to solve difficult dust recovery problems.

Write for a copy of the illustrated book—"The van Tongeren System of Industrial Dust Recovery," containing facts about this patented system, interesting alike to engineer and executive.

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DUST RECOVERY SYSTEMS

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

. . . of Industry

WILLIAM M. CALDWELL has been appointed assistant to the executive vice president of the Gray Iron Founders' Society, with headquarters in Washington. Previously he had been senior business specialist in the Gray Iron and Malleable Castings Section of the Office of Price Administration. Mr. Caldwell was graduated from the civil engineering school of Pennsylvania State College in 1927, and for the ensuing 3 years was with the New York district office of Jones & Laughlin Steel Corp. as sales engineer. In 1930 he joined the Coast and Geodetic Survey as chief of a level party, and from 1932 to 1935 he was a partner in and president of the Berkeley Iron Works, Jersey City, N. J. From 1935 until he joined the OPA in January, 1942, Mr. Caldwell was head instructor in the structural technology division of Pratt Institute, Brooklyn, N. Y.

♦ ♦ ♦

M. J. Gregory retired recently as factory manager of the foundry division of the Caterpillar Tractor Co., Peoria, Ill. He joined the company about 15 years ago, supervising the planning, erection and equipping of the Caterpillar foundry as well as its subsequent operation. Mr. Gregory served his apprenticeship with the Brown & Sharpe Mfg. Co., Providence, R. I. He attended Brown University and studied metallography at Massachusetts Institute of Technology under the direction of the late Dr. Albert Sauveur. Prior to joining Caterpillar Tractor Co. he was a consultant, with offices in Cleveland, in the design of foundries and machine shops, and previously was associated with General Motors Corp. for a number of years in similar work. A past director of the American Foundrymen's Association, Mr. Gregory has long been active in committee work and as a speaker at national conventions and chapter meetings of that organization. He is a past chairman of the Quad City Chapter of the A.F.A. Mr. Gregory plans to spend much of his time in Michigan where he purchased property several years ago.

Frank W. Shipley has succeeded Mr. Gregory as factory manager of the foundry division. A member of Caterpillar's foundry organization for the past 15 years, Mr. Shipley is a graduate of Purdue University. He was associated with the Studebaker Corp., South Bend, Ind., for 4 years, and later served with the Lakey Foundry & Machine Co., Muskegon, Mich., and Fairbanks, Morse & Co., Beloit, Wis. Mr. Shipley was made general superintendent at Caterpillar in 1942 and in January of this year became assistant foundry manager.

♦ ♦ ♦

Robert Bernard, recently elected chairman of the Eastern Canada and Newfoundland Chapter of the American Foundrymen's Association, is president and general manager of the J. A. Gosselin Co. Ltd., Drummondville, Que., with which company he has been associated the past 20 years. Mr. Bernard was born April 14, 1900 at St. Edouard, Que. He attended Mount St. Louis College, Montreal, and at an early age entered the shop of a small foundry and machine shop his father operated at Fortierville, Que. In 1924 his father took over the management of the J. A. Gosselin Co. Ltd., and Mr. Bernard went to work in the drafting office, later becoming plant superintendent. He was appointed manager on the death of his father in 1933, and last year also was named president. Mr. Bernard has been active not only in the A.F.A. but also in civic affairs. He is a past president of the local Chamber of Commerce and of the local branch of the Canadian Manufacturers Association.

♦ ♦ ♦

Anthony Haswell, who recently was elected president of the Malleable Founders' Society, is president of the Dayton Malleable Iron Co., Dayton, O., and has been associated with that company about 18 years. Mr. Haswell joined Dayton Malleable in 1926, following his graduation from Princeton University, and has served in various departments. He was elected president in November, 1942. Active in affairs of the industry, Mr. Haswell has been a director of the Malleable Founders' Society for several years and also has been a member of the industry's advisory committees to both OPA and WPB. Mr. Haswell is the son of John C. Haswell who long was active in the malleable industry, having been president of the Dayton Malleable Iron Co. and having served as president of an earlier trade association.

♦ ♦ ♦

A. Winkler Prins has been appointed manager of the New York sales district for American Machine & Metals Inc., East Moline, Ill. Mr. Prins was born in Java, later educated in Holland, and was graduated from the Carnegie Institute of Technology. Following graduation and until 1927, Mr. Prins was associated with the Worthington Pump & Machinery Corp., the Novo Engine Co. and Hubbard & Floyd Inc., distributors of heavy

(*Continued on page* 102)

WILLIAM M. CALDWELL

FRANK W. SHIPLEY

M. J. GREGORY

ROBERT BERNARD

South's Most Modern Mine

Produces Ore *for* WOODWARD IRON

View of outside plant of Pyne Mine. Buildings shown are: center—the supply store and machine shop; right—the bath house and compressor station; left—the man and material hoist house. Small building by the mine shaft is the lamp house and check-in gate.

This ore hoist at Pyne Mine pulls 22,400 pounds of ore from the bottom of the mine shaft at each haul at the rate of 1050 feet a minute.

Here is the electrically driven ore hoist which hoists the skips from the depths of Pyne Mine.

● Typical of Woodward's modernly equipped and completely integrated properties, comprising 78,000 acres, is this Pyne ore mine—largest in the Birmingham, Alabama, district—newest of Woodward's ore mines.

Started only two years ago, this modern mine is being steadily expanded. Eventually it is expected that its daily output will be 4,000 tons.

With all its base ore burden from the same ore body—its own ore mines—Woodward has been able to maintain outstanding uniformity in its growing output of merchant pig iron. Woodward's management invites inquiries from foundries seeking an ever dependable source of supply.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1883

General Sales Offices: 1515 First National Building, Birmingham, Alabama, Phone 4-6786

(*Continued from page* 100)

machinery. Prior to his present association, he was eastern sales manager for the Wellman Engineering Co.

♦ ♦ ♦

Dr. Zay Jeffries has been elected to the board of trustees of Battelle Memorial Institute, Columbus, O. Dr. Jeffries is technical director of the lamp department of General Electric Co., Cleveland; chairman of Carboloy Co. Inc., Detroit; and vice chairman of the War Metallurgy Committee of the National Academy of Sciences and National Research Council.

♦ ♦ ♦

R. E. Wilke, who recently was elected chairman of the Quad City Chapter of the A.F.A., is foundry metallurgist in the testing and research laboratories of Deere & Co., Moline, Ill. Mr. Wilke has been associated with the foundry industry since 1928 when he joined the Chicago Malleable Castings Co., Chicago, as a chemist. In 1935 he became foundry metallurgist for John Deere Tractor Co., Waterloo, Iowa, remaining there until 1941 when he assumed his present position. Mr. Wilke served as vice chairman of the Quad City Chapter during the past year.

♦ ♦ ♦

Perry D. Helser has been named secretary-director of the Magnesium Association, with headquarters at 3239 RCA building, New York. For the past 2½ years Mr. Helser was chief of the Magnesium Products Branch, Aluminum and Magnesium Division, WPB, Washington. Previously he was associated for about 10 years with the General Ceramics Co., New York, first as executive vice president and general manager and later as president. Mr. Helser was graduated from Ohio State University in 1917 and, following army service as a lieutenant in the Chemical Warfare Division, he engaged for a number of years in ceramic engineering work with various companies. Prior to joining the General Ceramics Co. he was for 4 years vice president in charge of manufacturing of the Eljer Co., Ford City, Pa.

♦ ♦ ♦

A. C. Behrendsen has been named vice president of Foundries Materials Co., Coldwater, Mich., and has opened offices in Hammond, Ind., for serving foundries with a general foundry supply and equipment line in Illinois and Indiana. Mr. Behrendsen formerly was Hammond branch manager for the Bondite Corp., and for 8 years sales manager of the Bentonite and Foundry Division of F. E. Schundler & Co. Inc., Joliet, Ill.

♦ ♦ ♦

L. J. Fletcher, training director, Caterpillar Tractor Co., Peoria, Ill., and **William J. Hebard,** personnel director, Continental Foundry & Machine Co., East Chicago, Ind., have been elected president and vice president, respectively, of the Industrial Training Directors' Association.

♦ ♦ ♦

Frank K. Metzger, formerly divisional vice president of Standard Steel Works Division, has been elected vice president in charge of sales of the Baldwin Locomotive Works, Eddystone, Pa. **John D. Tyson,** of the Standard Steel Works staff, has been elected vice president in charge of that division.

♦ ♦ ♦

Jules M. Keller, manager of foundries of American Car & Foundry Co., was honored by his company and associates with a dinner at the Missouri Athletic Club, St. Louis, June 13, in recognition of his 50 years continuous service with the organization. He is 72 years old.

♦ ♦ ♦

W. I. Foss Jr., for 16 years assistant sales manager, has been appointed sales manager of the transformer division of Kuhlman Electric Co., Saginaw, Mich., and **A. H. Ellerman** has been appointed assistant sales manager. Mr. Ellerman had been consultant for the WPB Transformer Section, Power Division for the past 2 years, and previously was assistant sales manager of the transformer division, Wagner Electric Corp., St. Louis. **J. H. Steel,** for 6 years a designing engineer in the engineering department at Kuhlman, has been transferred to the transformer division's sales department. **J. E. Bevan,** formerly vice president in charge of production for Roller-Smith Co., Bethlehem, Pa., is now manager of Kuhlman's New York office, succeeding the late D. F. Potter Jr. who had been in charge there for almost 20 years. Election of Albert E. Rhoads to the position of executive vice president and general manager of the company was announced in THE FOUNDRY for July.

♦ ♦ ♦

John M. Bubenheim has joined Ohio Steel Foundry Co., Lima, O., as electric furnace melter. Recently he had been assistant melting foreman for the Bonney-Floyd Co., Columbus, O. Mr. Bubenheim has been engaged in electric furnace melting work for about 12 years, his connections during that period including Otis Works of Jones & Laughlin Steel Corp., Cleveland; Keokuk Steel Casting Co., Keokuk, Iowa, and Valley Steel Castings Co., Bay City, Mich. For about a year he was stockhouse foreman of Central Furnaces Division, American Steel & Wire Co., Cleveland.

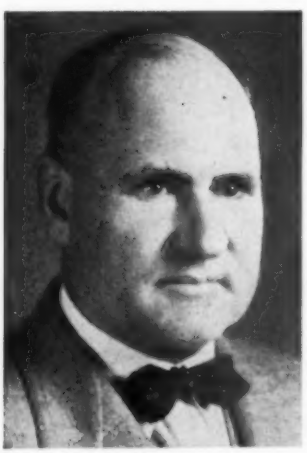
♦ ♦ ♦

R. V. Davies, recently product manager for the ingot division of the Aluminum Co. of America, Pittsburgh, has been appointed assistant general sales manager in charge of sales engineering and sales development activities. Other new assistant general sales managers appointed include **R. B. McKee,** who will have charge of district sales offices and all direct selling activities, and **Donovan Wilmot,** in charge of product manager activities and warehouse distribution.

♦ ♦ ♦

C. P. Croco has been appointed manager of a newly-formed welding department of the motor division, Westing-

(*Continued on page* 104)



DR. ZAY JEFFRIES

R. E. WILKE

PERRY D. HELSER

A. C. BEHRENDSEN

THE LAST DROP IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

Don't Stumble Into Trouble!

It pays to get the true facts about Core Oil. Price is important . . . but consistent UNIFORM QUALITY costs less in the long run. For over twenty years Dayton Core Oils have stood the test. Many of America's most important foundries are using these finer oils. Our Service Men are qualified to advise you accurately.

The

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STEEL CORE AND MOLD WASHES • BINDER AND CORE PASTE • CORE WASHES • CHILL COATINGS

(*Continued from page* 102)

house Electric & Mfg. Co. The new department is located at the Trafford, Pa., works. Since February, 1943, Mr. Croco had been director of engineering for the Federal Machine & Welder Co., Warren, O., but previously for 18 years had been associated as an engineer with the Westinghouse company.

♦ ♦ ♦

Fred P. Biggs has been appointed vice president in charge of sales of the Brake Shoe & Castings Division and the Southern Wheel Division of the American Brake Shoe Co., New York. Mr. Biggs joined Brake Shoe as sales inspector in 1916 and was made salesman in 1921. He was appointed assistant vice president of the company with headquarters in Chicago in 1934, and vice president of the Brake Shoe & Castings Division in 1938. **Stephen S. Conway** has been appointed assistant vice president of the two divisions. He joined American Brake Shoe Co. in 1912 ad has been in the sales department since 1929. His headquarters are in Chicago.

♦ ♦ ♦

J. G. Garrard has been elected vice president and general manager of the Ohio Malleable Iron Co., Columbus, O. Mr. Garrard has been associated with the malleable industry since 1913, his company connections during the period including the Northwestern Malleable Iron Co., Milwaukee; Terre Haute Malleable & Mfg. Co., Terre Haute, Ind.; Grand Rapids Malleable Works, Grand Rapids, Mich., and Michigan Malleable Iron Co., Detroit.

♦ ♦ ♦

William H. Seaman, president and general manager of National Roll & Foundry Co., Avonmore, Pa., has become chairman of the board, succeeding **R. Howard Webster. Richard J. Buck** has resigned as vice president but will remain as a director. **Colin W. Webster** and **J. A. Weingart** have resigned as directors and are succeeded by **C. N. Buchholz,** controller, and **E. R. Pierce,** general superintendent. **Donald H. Baum** has been elected vice president in charge of sales and a director.

♦ ♦ ♦

Lieut. Col. A. S. Behrman, recently returned to inactive duty (reserve) status after 2 years of active army service, has become associated with the Velsicol Corp., Chicago, as vice president and director of research. For many years prior to entering the army Colonel Behrman was vice president and chemical director of Infilco Inc., Chicago.

♦ ♦ ♦

Francis J. Merritt has rejoined the metallurgical staff of the Mueller Brass Co., Port Huron, Mich. Mr. Merritt was graduated from the Michigan College of Mining and Technology, Houghton, Mich., in 1936, and until 1941 was engaged in metallurgical work for the Mueller company. For about the next 2 years he was with the U. S. Naval Ordnance Plant, Centerline, Mich., first as senior nonferrous metallurgist and then as metallurgical supervisor in the laboratory in charge of ferrous and nonferrous casting work. Prior to returning to Mueller, Mr. Merritt for a short time was director of quality control for the four foundries of Howard Foundry Co., Chicago.

♦ ♦ ♦

Herman M. Brown has been appointed general manager of the Huntington Works of International Nickel Co. Inc., New York, succeeding **Arthur S. Shoffstall,** retired. The latter will continue as consultant to the head office of the company. **John A. Marsh** succeeds Mr. Brown as assistant general manager of the Huntington Works.

♦ ♦ ♦

J. Edward Donnellan, for the past 20 years secretary to the national technical committees of the American Society for Metals, Cleveland, has resigned to become vice president in charge of sales for the General Alloys Co., Boston. Mr. Donnellan was graduated from Pratt Institute, Brooklyn, and before joining the American Society for Metals in 1924 was associated with various companies in a metallurgical capacity, including the New Departure Mfg. Co., United States Naval Experimental Station and the Halcomb Steel Co. While with the A.S.M. he served as editor of the *Metals Handbook.*

♦ ♦ ♦

Ralph O. Anderson has been appointed district manager of the new West Central, Rocky Mountain district formed recently by the Norton Co., Worcester, Mass. Mr. Anderson has been with the Norton Co. more than 30 years, recently doing special sales work. For a number of years he was district manager in Pittsburgh.

♦ ♦ ♦

Carl F. LaMarche, since 1932 president and general manager of the American Malleable Castings Co., Marion, O., has been elected president and general manager of the Marion Steam Shovel Co., succeeding the late D. J. Shelton. **J. Malcolm Strelitz,** director and general counsel, has been elected chairman.

♦ ♦ ♦

DeWitt Thompson, formerly assistant general manager of sales for the Mathieson Alkali Works, has been promoted to lieutenant commander in the U. S. Naval Reserve. He joined the Navy in 1942 as lieutenant (sg) and is now in service at the Naval Air Station, Terminal Island, Calif.

♦ ♦ ♦

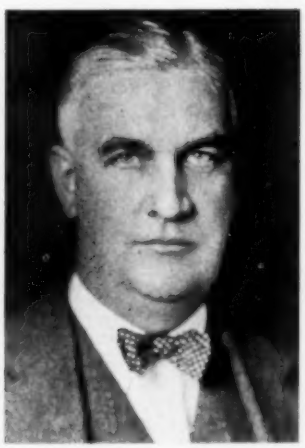
Edward H. Witte, recently president of the Witte Engine Works, Kansas City, Mo., has retired following his sale of the company to the Oil Well Supply Co., a subsidiary of the United States Steel Corp. Mr. Witte's business career extended over the past 63 years.

♦ ♦ ♦

H. P. Smith, formerly president of the George Chemical Co., and **Thomas T. Schulten,** formerly with the General

(*Concluded on page* 106)

FRED P. BIGGS



J. G. GARRARD

WILLIAM H. SEAMAN

LIEUT. COL. A. S. BEHRMAN

Faster-Start to Finish

That's mighty important today!

Because the sailing of a ship, for example, might be held up because a contractor had to wait for a casting like the one in the illustration. With Truline, foundry men find jobs run smooth—and faster. First, you save time in making the cores themselves. Then you save in baking and clean-up.

But the real pay-off and probably as important a time-saver as any comes with final inspection. Rejects because of "off size cores" or "hot tears" are fewer when Truline cores are used.

All of which adds up to quicker delivery on today's vitally needed castings. Write for complete information. Use the coupon below.

Saves Time—these 3 ways

1 FORMS FASTER

Truline cores ram quickly, giving dense cores with freedom from sagging. *This means more cores per hour per core maker!*

2 BAKES FASTER

Truline cores harden under low oven heat, dry without oxidation. Oven-time is less, output greater!

3 CLEANS FASTER

Truline cores burn out readily. Core sand shakes out easily, saving valuable clean-up time.

TRULINE BINDER

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HERCULES POWDER COMPANY
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999 Market St., Wilmington 99, Delaware

Please send ☐ sample ☐ information on how to use Truline Binder in casting:
(state type of work and kind of metal cast)

Name _____ Title _____
Company _____ City _____ State _____ NB-42
Address _____

JAMES T. MacKENZIE

P. H. BATES

ARTHUR W. CARPENTER

SAM TOUR

(*Concluded from page* 104)

Chemical Co., have been appointed field representatives of the New York office of the Mathieson Alkali Works.

♦ ♦ ♦

P. H. Bates was elected president of the American Society for Testing Materials at its recent annual meeting. He is chief of the clay and silica products division of the National Bureau of Standards. **Arthur W. Carpenter,** manager of the testing laboratory of the B. F. Goodrich Co., Akron, O., was named vice president. Among those elected to the society's executive committee are **James T. MacKenzie,** chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., and **Sam Tour,** president, Sam Tour & Co., New York.

♦ ♦ ♦

C. P. Randall has been appointed service engineer in New England for Hickman, Williams & Co., 300 Madison Avenue, New York. He has specialized in metallurgy, sand and clay research and control. For the past 3 years he had been service engineer for Eastern Clay Products Inc., Eifort, O., and for 18 years prior to that had been employed by the Hunt-Spiller Mfg. Corp., Boston. Mr. Randall is a graduate of Northeastern University and completed a special foundry course at Wentworth Institute.

♦ ♦ ♦

Max Traum, recently vice president of Sacks-Barlow Foundries Inc., Newark, N. J., has been elected president to succeed the late David L. Sacks. Mr. Traum has been associated with the company for the past 24 years.

♦ ♦ ♦

George Pagonis has joined the Permanente Metals Corp., Permanente, Calif., as assistant superintendent of its sand casting foundry. Mr. Pagonis has been associated with the foundry industry for 33 years, the past few years in magnesium casting work. He was formerly general supervisor of the magnesium foundry of the Eclipse Aviation Division of Bendix Aviation Corp., Bendix, N. J.

♦ ♦ ♦

Col. John Slezak, on leave of absence since January, 1942, as president of the Turner Brass Works, Sycamore, Ill., has been appointed chief of the Chicago Ordnance District. Colonel Slezak first served as the district's assistant chief of the ammunition branch. Later he was made chief of the tank and automotive branch, and in August, 1942, he was named chief of the industrial division. Four months later he became deputy district chief, holding this post until his latest promotion.

♦ ♦ ♦

F. W. Keltner has been appointed manager of Kenton Foundries Inc., Kenton, O.

♦ ♦ ♦

Walton L. Woody, vice president in charge of operations for National Malleable & Steel Castings Co., Cleveland, has been elected a director of that company.

♦ ♦ ♦

Ned Jones, formerly chief engineer and metallurgist for the Stockham Pipe Fittings Co., Birmingham, Ala., is now a second lieutenant in the U. S. Marines.

♦ ♦ ♦

L. D. Harkrider, president of General Malleable Corp., Waukesha, Wis., has been elected a director of Waukesha Motor Co.

C. P. RANDALL

MAX TRAUM

GEORGE PAGONIS

COL. JOHN SLEZAK

STERLING

THE WHEELS OF INDUSTRY

Sterling Teamwork Turns Out *Your* Wheels Faster

Sterling Catalog No. 44 is just off the press . . a complete compilation of everything you need know about grinding wheels. There is data on wheel faces, safety tips, complete explanations of the type of wheel necessary for various jobs. Send today for your free copy . . you will find it handy to have near at hand for quick solution of many problems.

Sterling "kiln gangs" are working faster these days, helping turn out the "Wheels of Industry" as fast as is consistent with high quality. Everyone at Sterling—in the laboratories, the plant, and offices—is trying his or her level best to make and ship your Sterling Grinding Wheels on time.

If our deliveries sometimes seem slow, it is not lack of interest in your problem . . it is simply the result of wartime conditions that stretch out the time necessary to make wheels of the high quality demanded by your difficult grinding jobs.

We like to think that Sterling Grinding Wheels are helping industry hasten victory. That is why so many Sterling workers are interested in turning them out as fast as possible. Many of us have sons and daughters in the service—that is an incentive, too!

What is your unusual grinding problem . . we would like to help you solve it. Sterling engineers are ready at anytime to consult with you on the best methods to use in obtaining quality grinding. Often some small change in setup will do it. There is no obligation . . write us today for any help we can give!

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THE STERLING GRINDING WHEEL DIVISION

OF THE CLEVELAND QUARRIES COMPANY

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THE WHEELS OF INDUSTRY

No. 8 Mexican Graphite lowers chill depth and Brinell hardness, increases deflection and machinability

Photomicrograph from broken half of 1.25 inch arbitration bar of grey iron not treated with No. 8 Mexican Graphite. Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties:

Transverse Strength	2,497 lbs.	Total Chill Depth 41/32 in. (wedge bar)
Deflection	0.23 in.	Clear Chill Depth 26/32 in. (wedge bar)
Brinell Hardness	229	

Photomicrograph from broken half of arbitration bar of same base iron as above but treated with 1 lb. per ton of No. 8 Mexican Graphite. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties:

Transverse Strength	2,907 lbs.	Total Chill Depth 13/32 in. (wedge bar)
Deflection	0.31 in.	Clear Chill Depth 10/32 in. (wedge bar)
Brinell Hardness	217	

As is clearly revealed in photomicrographs (see panel), the addition of 1 lb. of No. 8 Mexican Graphite per ton reduced chill depth and Brinell hardness, increased deflection and thereby improved machinability.

In every foundry where it is used, No. 8 Mexican Graphite produces similar improvements in finished castings. Machinability is greatly improved and the cost of metal control is lowered.

No. 8 Mexican Graphite is an especially prepared product, dustless and free of volatile matter. Packed in 100-lb. bags for easy handling, No. 8 Mexican Graphite effectively improves grey iron castings at a cost of less than 10c per ton.

If you are interested in treating your grey iron easily and at low cost, increasing machinability and obtaining a higher percentage of perfect castings, it will pay you to make ladle additions of No. 8 Mexican Graphite to your iron. Send us your casting problems and we will be happy to offer recommendations without obligation.

No. 8
Mexican Graphite

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

Foremost of the problems facing many gray iron foundries is that of manpower supply. A review of the situation and possible remedies are contained in this report of the Gray Iron Founders' Society's recent Chicago regional conference

Manpower Problems in Gray Iron

CRITICAL manpower problems in the gray iron foundry industry were reviewed, and solutions to those problems were discussed, at a Manpower-Price Control Conference held July 6 at the Stevens Hotel, Chicago. Approximately 200 gray iron foundry executives from the Central West attended the meeting, the third in a series of successful regional conferences being conducted in various parts of the country by the Gray Iron Founders' Society. Walter L. Seelbach, president, Gray Iron Founders' Society, and secretary, Forest City Foundries Co., Cleveland, presided.

William B. Murphy, deputy vice chairman for production, War Production Board, Washington, and co-chairman, National Foundry and Forge Shop Committee, traced the change in war production demands which has brought more attention to the gray iron industry during the past year. He indicated that until the present shortage of gray iron castings is relieved, the gray iron industry is going to be "hounded." The problem of manpower shortages in the foundry is being given top side attention.

Mr. Murphy pointed out that while there is plenty of plant capacity in the gray iron foundry industry, difficulties have arisen in manning that capacity. To emphasize the importance of the gray iron shortage, he stated that in June the heavy truck program was 32 per cent behind schedule and that 75 per cent of this shortage was due to shortages of gray iron and malleable iron castings. The July program for heavy trucks has been increased 25 per cent, further emphasizing the greater need for more castings. The light truck schedule is 12 per cent behind, due chiefly to gray iron shortages. While the demand for castings has exceeded production, Mr. Murphy pointed out that the industry has made some headway during the past year. Tonnages have been increased from 15 to 20 per cent, but an additional 25 per cent increase is needed if the truck, military tractor, engine and several other programs are to be met. Throughout his discussion Mr. Murphy repeated that the importance of the present shortage of gray iron castings cannot be over-emphasized.

The speaker discussed at some length the steps which government is taking to improve the situation. He stated that the organizations working on this problem are not interested in opinions or who is at fault for the present shortages, but are interested only in producing more castings. He indicated that the plan to import Mexican labor did not materialize because of political situations in Mexico.

Mr. Murphy stated that the War Manpower Commission is engaged in a strenuous drive to recruit labor for foundries. Field men have told in no uncertain terms what must be done, and this

WALTER L. SEELBACH
President
Gray Iron Founders' Society Inc.

will be followed up in order to see that available labor is directed toward the foundry industry. WMC will use the radio with spot announcements to recruit manpower, and this effort will be directed along the patriotic theme.

WMC, WPB, and the Army and Navy have united in a program to render every assistance to the foundry industry. The Office of Labor Production is concentrating its efforts on the critical foundry situation. Mr. Murphy pointed out that the Office of Labor Production frequently can get at labor problems which may be difficult for management to solve. Special emphasis has been placed on getting action on cases now before the War Labor Board.

The OWI, the information divisions of the WPB and the WMC, and the industrial services of the Army also have joined to extend every assistance in solving the present labor problem. General Somerville has sent telegrams to many plants making war castings urging workers to match soldiers' blood with the sweat of labor. White and colored veterans from the battle fronts are visiting foundries to instill the fighting spirit in the men on the production line. It is being pointed out that the Navy has air fields in the South Pacific which cannot be manned because gasoline trucks and crash trucks are not available. A series of movie shorts have been prepared and are available for use in foundries. A special movie is being produced which will be built around the foundry, showing foundry scenes and battle scenes and telling the story of how castings are used in war equipment.

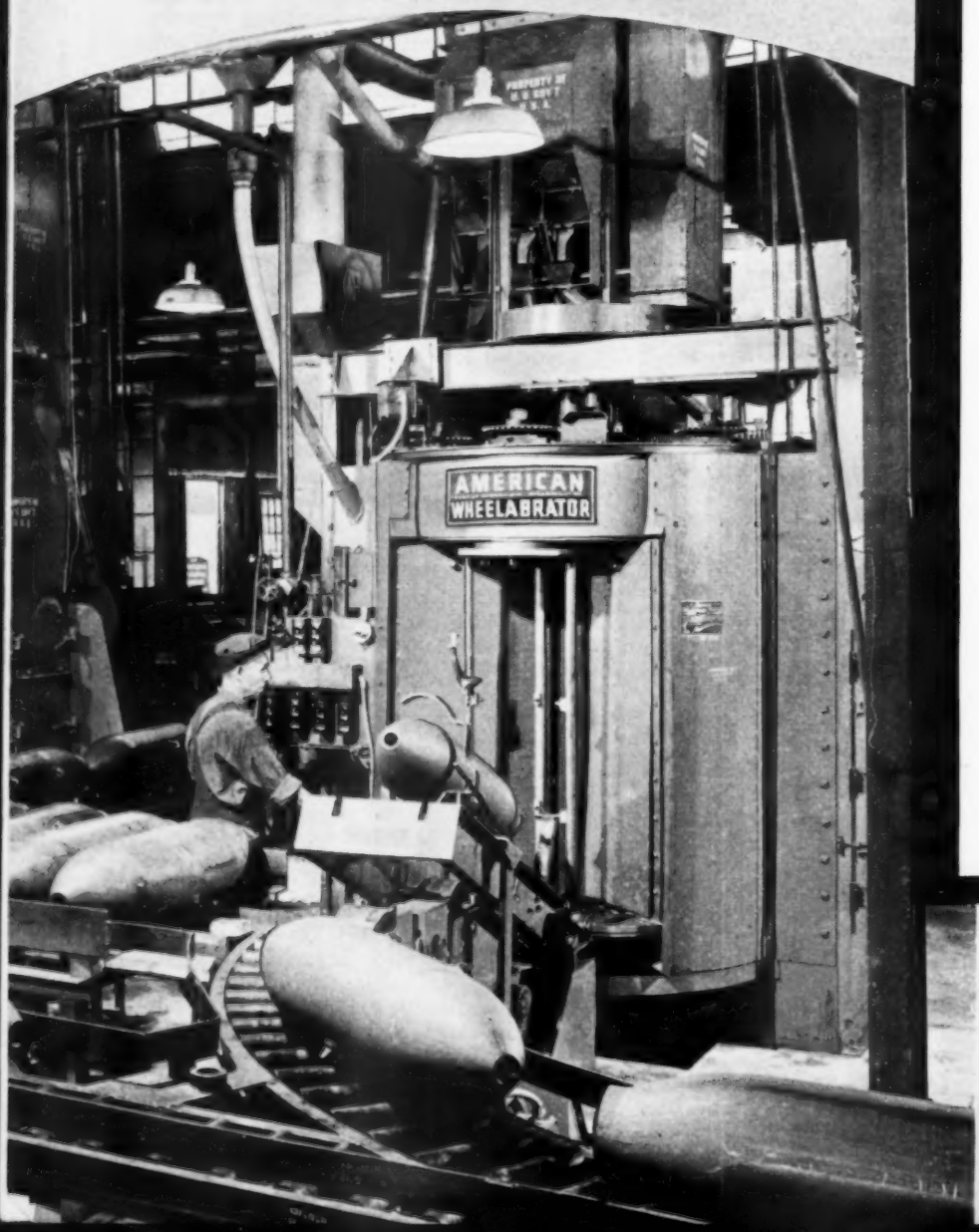
According to Mr. Murphy, the Production Executive Committee, consisting of top men in the government agencies, has placed gray iron and malleable iron on the urgency list and has ordered that directives be used to procure castings needed for the war effort. Such directives will supersede the priority system. Also efforts are being made to open new capacity for certain castings, particularly engine blocks and heads.

In discussing the work of management in meeting the labor shortage problem, Mr. Murphy stated that industry must handle the principal part of the job. He suggested the following steps which should be taken by management: 1—Put first things first and make the critical castings before pouring the other jobs in the plant. 2—Undertake a more aggressive recruiting plan. 3—See that all new men are trained before being placed on the production line so that losses will be reduced and turnover will be held to a minimum. 4—Provide better labor relations. 5—Use more women in the foundries. 6—Improve working conditions as much as possible under present circumstances. 7—Mechanize wherever such efforts will reduce the need for manpower or will increase production. 8—Do a better job in preparing and selling cases before the Office of Price Administration. 9—Do a better job in preparing and selling cases before the War Labor Board. 10—Key the organization to the problems at hand. Mr. Murphy

(*Continued on page* 112)

HOW THE AIRLESS *Slashes*

Your blast cleaning problems may present a mountain size obstacle to you . . . but you can make them vanish into mole hills by calling on American's experience. There is convincing proof in the history of thousands of cleaning applications handled by the Airless Wheelabrator that this method is earning its way by effecting unusual reductions in cleaning time, cost, manpower, and space. Check over this "fact chart" from performance reports and you can see why "In number of machines sold and variety of applications handled American leads the field."



COMPANY AND LOCATION
Stanley G. Flagg Co. Stowe, Pa.
American Crucible Products Co. Lorain, Ohio
General Railway Switch Company Rochester, N. Y.
Henry Disston & Sons Philadelphia, Pa.
Benjamin Eastwood Co. Paterson, N. J.
H. Belfield Co. Philadelphia, Pa.
Wood Bros. Thresher Co. Des Moines, Iowa
Pontiac Foundry & Mach. Co. Pontiac, Mich.
Dorn Manganese Bronze Corp. Brooklyn, N. Y.
Westinghouse Elec. & Mfg. Co. E. Pittsburgh, Pa.
Superior Castings Corp. South Norwalk, Conn.
Canadian Bronze Co., Ltd. Montreal, Quebec
Beach Foundry Co. Ottawa, Ontario

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Wheelabrator

CLEANING TIME

PRODUCT	QUANTITY OR WEIGHT	FORMER METHOD EQUIPMENT	FORMER METHOD TIME	WHEELABRATOR METHOD TIME
Pipe Caps	1900 lbs.	Airblast Barrel	18 min.	4 min.
Brass Castings	.....	Airblast Barrel	18 hours	3 hours
Machine Gun Bases	35 bases	Airblast Tables	3 hours	18 min.
Armorplate	.....	Airblast Room	3 hours	1 hour
Gray Iron Castings	.....	Airblast Barrel	1 hour	6 min.
Valve Bodies	.....	Wire Brushes	8 hours	1½ hours
Tank Doors	12 doors	Airblast Table	6 hours	1 hour
Gear Blanks	.....	Tumbling Barrels	11 hours	3½ hours
Brass & Bronze Castings	.....	Wet Tumbling Barrel	40 min.	5 min.
Malleable Iron Caps	160 caps	Airblast Cabinet	1½ days	16 min.
Tanks and Covers	8-14 pieces	Airblast Cabinet	25 min.	4 min.
Journal Bearings	75 bearings	Sand Blast Room	30 min.	4 min.
Bomb Nose Plugs	1000 plugs	Tumbling Barrel	3 hours	15 min.

ARMY NAVY
THE AMERICAN MOLDER
TRADE MARK REG. U. S. PAT. OFF.

American
FOUNDRY EQUIPMENT CO.
505 S. BYRKIT ST. MISHAWAKA, IND.

(*Continued from page* 109)

stated that the WPB stood ready to help in connection with the amortization of new equipment where it can be shown that installation of such equipment is justified. In closing Mr. Murphy stated that "castings are the backbone of the whole war production."

Joseph D. Keenan, vice chairman for labor production, WPB, and a member of the National Foundry and Forge Shop Committee, emphasized the need of human relations in solving the problem of foundry manpower. He stated that management and the people working in foundries have not been told enough of the importance of the product and the delay and loss that will be encountered if castings are not delivered on time.

Mr. Keenan stated that many things were done in peacetime which have gone by the boards in war production. Old employes in the main have accepted foundry conditions and have remained on the job. However, new people employed to replace those called up for the armed services have come to the industry with ideas of working conditions in other industries. Mr. Keenan stated that many of these new people will not work under old conditions and that management must consider doing a housekeeping job.

The speaker pointed out that government and management must let the workman know the facts about the work that is being produced. No matter how unimportant a particular part, it usually becomes most important in the end product which reaches the battle front. It is necessary for all to put into the workers' minds that we must deliver castings, no matter what the complexities. The speaker stressed the need of getting maximum production with the people now available and of educating employes on the particular jobs that they must do. In closing he stated that men in the labor office of the WPB are trying to get the job done and are not carrying the banner for labor.

In discussing the castings production problem from the viewpoint of industry, George W. Cannon, president, Campbell-Wyant & Cannon Foundry Co., Muskegon, Mich., and a member of the Gray Iron Foundry Industry Committee of the WPB, stated that the management of gray iron foundries has responded nobly whenever called upon to meet war production problems. He stressed the present critical situation as far as manpower is concerned and stated that recruiting efforts have been handicapped seriously by government restrictions and adverse publicity by various government officials. He quoted statistics of the Bureau of Labor Statistics to show that in February, 1944, the average hourly earnings of all manufacturing was $1. while in the gray iron industry the average hourly earnings were $1.05. These figures also showed that a survey of critical foundries reported over 65 per cent of present employes had worked 5 years or more in the foundry industry and generally in the same plant. Statistics on the rate of turnover indicate that the gray iron foundry industry compares favorably with other industries.

Mr. Cannon stated that the gray iron industry recognizes the interdependence and need for harmonious co-operation between government, labor and management. He indicated that the WMC must increase its efforts to direct workers into foundries and revise foundry occupations upward on critical lists. Use of women in foundries should be encouraged wherever possible for the duration, and oc-

(*Continued on page* 156)

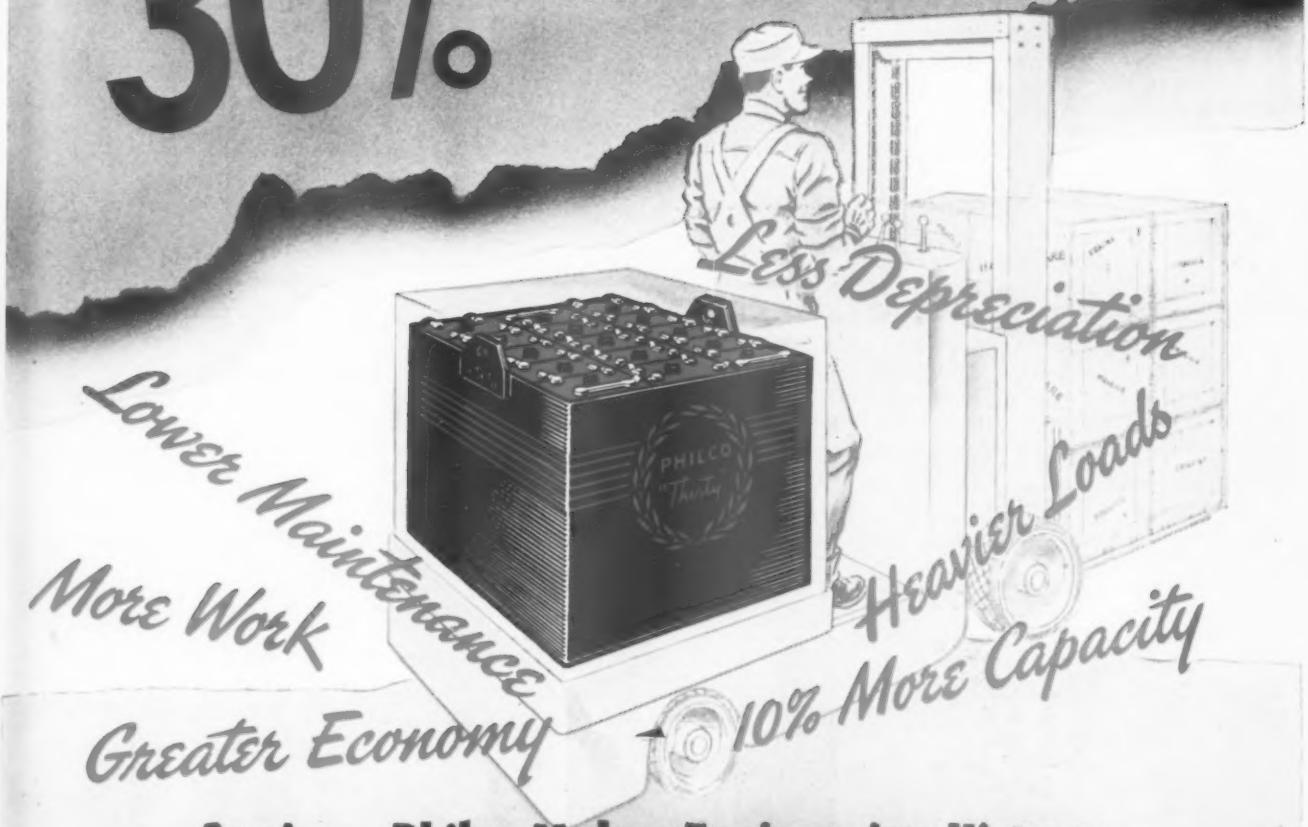
WOMEN WORKERS IN THE FOUNDRY

Contrary to the distorted notions held in some circles—including governmental—regarding working conditions, many women find the foundry an agreeable place in which to work. In fact, were it not for the large number of women capably holding down various types of jobs in the industry today, the foundry labor situation would be decidely worse.

Women have been found particularly useful in core making and assembly, where a deft hand is required, but also are doing a variety of other types of work successfully. The view at the right, taken at the Radford, Va., plant of the Lynchburg Foundry Co., shows Mrs. Gertrude Wood and Mrs. Susan Linkous finishing a core. The group below is known as the "co-eds in foundry practice" and consists of the women employed in the steel foundry of the Wehr Steel Co., Milwaukee.

Just Announced!

REVOLUTIONARY NEW "PHILCO THIRTY" GIVES 30% LONGER LIFE!



Again . . . Philco Makes Engineering History

At last, a motive power battery with a revolutionary, new construction that actually gives you *30% longer life . . . and more!* A brand new principle of fabricated insulation . . . developed after years of research in the Philco laboratories, and now introduced after exhaustive tests in actual service. It's the *Philco "Thirty"* . . . your post-war battery, available now in certain types and limited quantities. Write today for full information.

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FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

INDUSTRY ... Briefs

AMPCO METAL INC., Milwaukee, has completed its new plant at 30 East Burbank boulevard, Burbank, Calif., where West coast activities of the company hereafter will be concentrated. The new plant will produce Ampco metal by both the centrifugal and sand cast process, while extruded and other wrought products manufactured at Milwaukee will be stocked at Burbank. Plant personnel at Burbank includes: Works manager, E. H. Wilson; plant superintendent, P. P. Bergmann; field service engineer, O. D. Cooper, assisted by L. C. Dean. These men had been associated with Ampco's previous West coast manufacturing facilities, the Hollywood Aluminum Products Division of Ampco Metal.

• • •

Aluminum Industries Inc., Cincinnati, is enlarging its foundry capacity at its Bridgetown plant with the construction of an 80 x 200-foot addition. A separate building is being erected for remelting operations.

• • •

Allyne-Ryan Foundry Co., Cleveland, has let contract for a 64 x 310-foot addition, including elevator, core-drying ovens, and other equipment, to cost about $166,000.

• • •

Central Foundry Co., Holt, Ala., has let contract for an ordnance plant addition and alterations, estimated to cost about $200,000.

• • •

Saltville, Va., plant of the Mathieson Alkali Works was awarded the Army-Navy "E" June 19 at ceremonies held at the plant.

• • •

Caterpillar Tractor Co., Peoria, Ill., recently received the National Safety Council's special wartime award for distinguished service to safety. Presentation of the "S" pennant was in recognition of the company's reduction in its accident frequency rate from 21.42 in 1941 to 10.3 in 1942 and to 4.43 in 1943.

• • •

Production of steel castings in April of 155,778 tons was the smallest monthly total since February, 1943, according to reports to the Department of Commerce by 187 producers. This compares with 174,626 tons in March and 161,403 in April, 1943. April orders booked, less cancellations, were 175,053 tons, against 162,575 in March and 165,792 a year ago.

• • •

Manhattan Rubber Mfg. Division of Raybestos-Manhattan Inc., Passaic, N. J., has received renewal of the Army-Navy "E" originally presented the company Oct. 28, 1943.

• • •

Skilsaw Inc., Chicago, has received for the third time the Army-Navy "E" for excellence in production of war materials.

• • •

Brass and bronze ingot shipments during May by 54 producers totaled 45,418 tons, according to the Defense Council of the Ingot Brass and Bronze Industry. This compares with 43,151 tons in April.

• • •

Falk Corp., Milwaukee, has been granted a fourth renewal of the Navy "E" award.

• • •

Mateas & Mateas, 504 Orchard avenue, El Monte, Calif., has obtained a permit for construction of a 32 x 76-foot addition to its foundry building to cost $5000.

• • •

T. P. Gardiner, 2707 Union street, Oakland, Calif., is starting erection of a one-story foundry building at that address. Estimated cost is $30,000.

• • •

Master Foundry Co. has been incorporated at Cleveland by Andrew H. Baker, president, and has bought the U. S. Foundry Co., 15016 Saranac road, that city, which it will continue to operate. The foundry contains about 20,000 square feet of floor space. Expansion of the plant and installation of new equipment is planned.

• • •

Orders for foundry equipment placed in May reached the highest level in 14 months, according to the index of the Foundry Equipment Manufacturers Association. May sales represented 503.9 per cent of the 1937-39 monthly average, compared with 385.7 per cent in April and 348.9 in May, 1943. The gain was entirely in sales of new equipment, orders for repair parts declining.

• • •

Delta Oil Products Co., Milwaukee, has been awarded the Army-Navy "E" for the third time, representing the second renewal of the pennant first presented the company more than a year ago.

• • •

Illinois Pneumatic Tool Co., Aurora, Ill., has been advised of the third renewal of its Army-Navy "E" award. Company employes originally won the pennant Oct. 8, 1942.

• • •

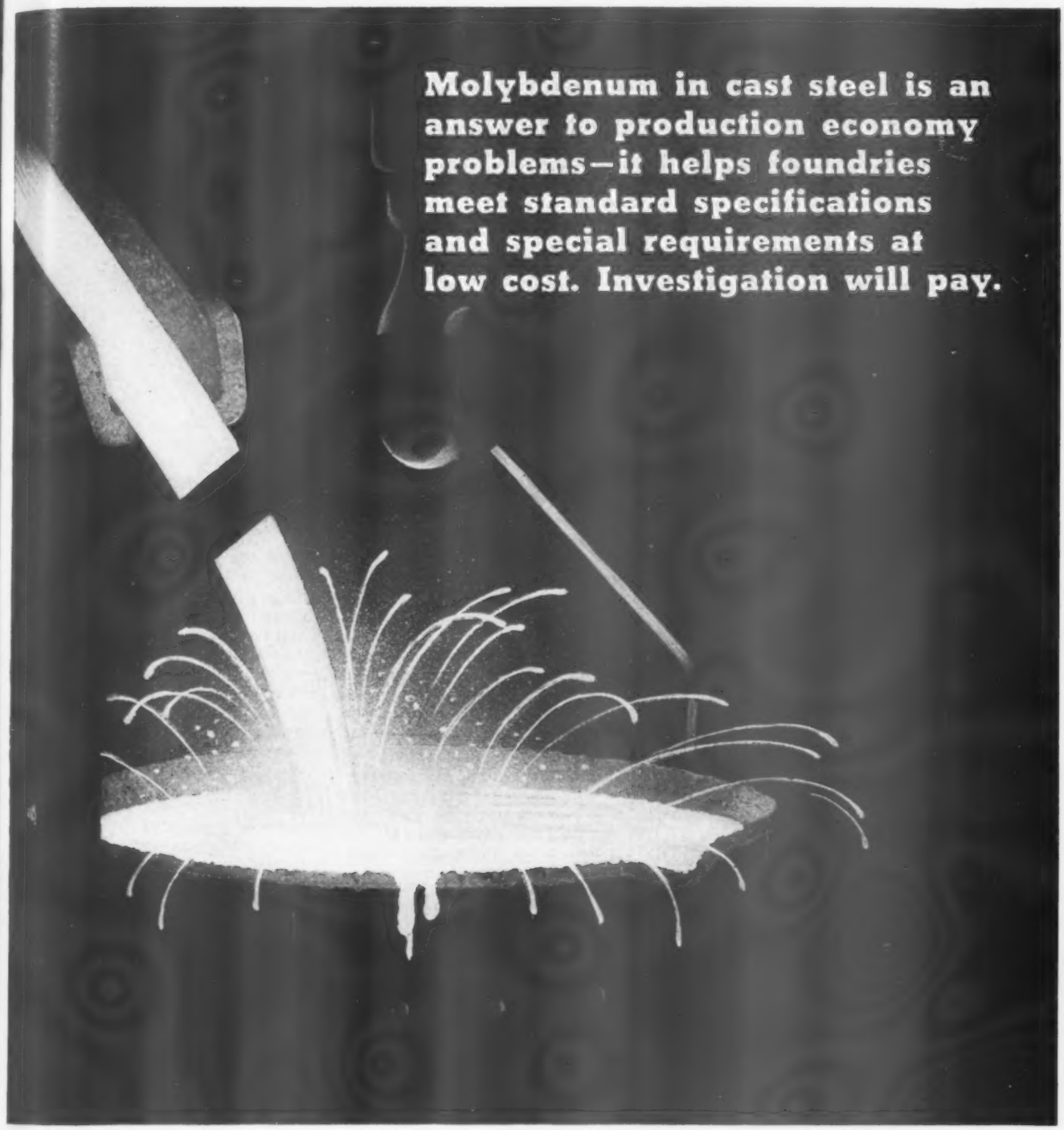
El Monte Foundry Co., El Monte, Calif., has received a building permit for alterations and improvements to cost $1000.

• • •

Whiting Corp., Harvey, Ill., has received a second white star to add to its Army-Navy "E" pennant originally awarded the company on March 27,

(*Concluded on page* 146)

VARIETY IN CASTINGS: This picture was taken to indicate the wide variety in size and types of steel castings made by the National Supply Co. at its Torrance, Calif., foundry. These castings are largely for oil well drilling equipment


Molybdenum in cast steel is an answer to production economy problems—it helps foundries meet standard specifications and special requirements at low cost. Investigation will pay.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

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MOLY

around DETROIT

BY A. H. ALLEN
Detroit Editor,
The Foundry

Large motor foundries not adapted to mass handling of job shop work such as castings for army truck program, otherwise gray iron casting shortage would evaporate overnight . . . . Moves by government are expected to have little influence in remedying critical labor supply situation.

IT IS perhaps an encouraging sign when the worrying experts at the WPB and elsewhere in Washington really start to "beat their gums" over the critical situation in the gray iron castings field, particularly automotive castings. So many times in the past, when finally the WPB gets around to official worrying about some trouble in the field, the difficulty actually is pretty well past. This probably will prove to be the case as far as automotive gray iron is concerned.

Briefly, the alleged difficulty is this: The army's heavy-duty (2½-ton and over) truck program is in danger of being bogged down because of shortages in supply of cylinder blocks, cylinder heads, cylinder sleeves, transmission cases, axle housings, flywheels and a number of other iron castings. Reason for the shortage is claimed to be lack of manpower in the foundries involved, and the manpower deficiency springs from the fact that war workers do not like foundry jobs because they are hot, dirty and poorly paid.

Have Been Closed

Now an industry that supplied gray iron castings for the production of 5,000,000 car and truck engines in a year's time certainly *should* have no trouble in meeting the requirements of several hundred thousand truck engines. However, the large mass-production gray iron automotive foundries have been closed down for the past 2½ years, although most of the equipment still is in place and could be readily operated. True, the manpower formerly employed in these foundries has gravitated elsewhere—to machine jobs, to aluminum foundries, to steel foundries, etc. Furthermore, these large mass-production shops are not suited to handling a variety of small short-run jobs like those involved in the truck program. This work properly belongs in the job shop field but right at the moment the job shops are jammed to the guards with more business than they can handle, more business than they could be expected to handle.

If some way could be found to lump all these truck castings into a single group and schedule them through one of the large motor foundries like Chevrolet Gray Iron, for example, the alleged shortage would evaporate overnight. The only trouble is it would probably take 6 months to do the preliminary planning, arrange molding machines, coreblowing machines, conveyors and other equipment for this mass handling of job shop work. It could be done, foundrymen assert, by such devices as standardizing on flask sizes, grouping different castings in a single mold, making extensive use of coreblowing, and so on, but by the time the advance planning was executed and facilities arranged the job shops probably would have caught up with their orders and the need would have passed.

The question asked by a leading WPB official—"if the (automotive) industry plans on expanding its foundry capacity after the war, why doesn't it do so now when such capacity might be very useful in meeting these war shortages"—reflects the oversimplification which many in Washington apply to a problem, principally because of a lack of familiarity with the industry. True, the motor plants are planning expansion of foundry capacity for postwar, but such facilities, even if available now, would be of no conceivable value. Look at the large foundries like Buick, Packard, Dodge, and Chevrolet Gray Iron where the cupolas, molding machines and conveyor systems have been gathering dust these many months. A few more cupolas, a few more molding machines and a few more miles of conveyor would not give the Army the truck castings it now says it needs. These large automotive foundries are laid out to produce enormous quantities of half a dozen specific types of castings. The minute you try to make job shops of them by bringing in a few of this type of casting and a few of that type, and then something else, you are going to have metal running all over the floor and the place in a hell of a mess.

Buick's gray iron plant now has resumed limited production, something like 35 tons per day on two shifts, the bulk of it on the first shift. Blocks and heads for Hercules engines are being cast, but there does not appear to be any great pressure on stepping up this meager production, another indication that the need is for variety and not volume. If it was volume, Buick could shut down its aluminum foundry and move all the men over to the gray iron plant, with the result Hercules would be so flooded with heads and blocks they could never crawl out from under them.

Packard is proceeding with plans to

(*Concluded on page* 119)

MUSKEGON FOUNDRYMEN: View of the foremen and executive group of Lakey Foundry & Machine Co. and guests from Continental Motors Corp. taken at their meeting held at Slovak Hall, Muskegon, Mich., the evening of June 24. Featuring the program was an illustrated talk on core blowing by M. J. Gregory, recently factory manager of the foundry division, Caterpillar Tractor Co., Peoria, Ill.

As Manpower Problems grow more acute!

As war production reaches its peak, the manpower situation in industry demands the use of more women and older men. More than ever, Mathews Engineering is essential. Mathews Gravity and Power Conveyers, and the special devices which make Mathews Systems prominent, are on the job in the great war plants of the United States and Canada, helping to move materials through manufacturing departments, with greater control, lower cost, and with a minimum of fatiguing effort on the part of machine operators. Mathews Engineering service is available in principal cities of the United States and Canada.

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ELLWOOD CITY, PENNSYLVANIA

Give "Green Hands" Blue Flash Performance

Here's help for "newcomers" . . . cut-off wheels that compensate to the fullest possible extent for workers' undeveloped skill... wheels that cut clean, free and straight with minimum amount of burr and burn . . . wheels that weather rough treatment.

Train "green help" to recognize features that add finesse to the quality of their work. With Bay State resinoid-bonded, rough-sided cut-off wheels, they get freer cutting action, longer life. Discoloration and heat are minimized because contact surface area is noticeably reduced.

Bay State makes wheels for every type of cut-off machine... rubber-bonded wheels for wet operations, resinoid-bonded wheels for dry. Constant rigid laboratory inspection of raw materials . . . modern ovens with delicately-set temperature regulators... and other factory refinements contribute to the mounting reputation for leadership of Bay State "Blue Flash" cut-off wheels just as they do for Bay State's complete line including all types of grinding wheels and other molded abrasive products. Bay State's reputation for honing and superfinishing stones is unexcelled.

Test a wheel to see how Bay State quality helps "green hands" and veterans too. For additional details get Bay State's Cut-off Bulletin. Write...

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

BLUE FLASH GRINDING WHEELS *FAST and COOL*

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS · AND CYLINDERS

(*Concluded from page* 116)

resume some gray iron production, but it may be October before this is under way. Meanwhile, production of aluminum castings at Packard is being tapered off and eventually will be terminated. Refurbishing the gray iron plant will call for initial expenditure of around $50,000, but this is only a part of what ultimately will be expended.

Directives, decrees and manifestos are flowing out of Washington seeking to bolster the foundry manpower situation, but it is not felt generally they will accomplish much. In the first place, manpower, unlike machine power, cannot be herded about wherever the need at the moment happens to be greatest. Men and women still like to reserve themselves the decision as to where they will work and whether they will work. In the second place, it is difficult if not impossible to take an upgraded former foundry worker and force him back to his old job if his present job still is available. This leaves the remaining expedient of offering wage inducements to attract foundry workers.

A common belief that foundry labor is underpaid was given the lie by the editor of this publication last month, figures being cited to show average hourly rate in foundries several cents above the average hourly earnings of all manufacturing industries. Furthermore, any increase in wage levels would have to be counterbalanced by increases in prices for castings, which merely would be adding another spiral to inflation.

Practice Good Housekeeping

Adverse working conditions are another whiplash with which the foundry industry currently is being belabored. This is nothing new, for over the past two decades the subject of good housekeeping is one with which foundry operators have at least been conversant if not always practitioners. Every new foundry that has been built has embodied advanced ideas for the comfort and convenience of working people. Nearly every modernization program has included such improvements, including dust collectors, better ventilation, modern washrooms, cafeterias, and the like. It is a process of evolution which cannot materialize overnight.

Automotive foundry operators have tried to keep abreast of housekeeping improvements, but some of their plants leave much to be desired. A novel idea has been suggested by James F. Miller of Chevrolet Gray Iron in Saginaw. It is the use of glazed tile on all foundry walls and partitions. He estimates its use could effect a saving of $25,000 a year in maintenance costs alone in his plant, to say nothing of the improved working conditions it would engender.

* * *

THE QUEST for a superior bearing bronze, as it appears woven into the early history of Richard F. Agricola and his experiences as a journeyman foundryman, makes interesting reading in a little booklet called *Men and Metals*, written for the Saginaw Bearing Co. by Glenn R. Larke. The elder Agricola (his son William L. is now president of the Saginaw company) was born in 1867 and came to Detroit in 1904 to start a small brass foundry with $60 capital. After twice going broke he began to concentrate on designing equipment to amalgamate high leads, low tin and copper so that the distribution of tin and lead through the copper matrix would be even and of small structure. His two sons, Karl and William, helped to build the first furnace—a 30-gallon oil drum lined with firebrick and fired by an oil burner using a fan from a worn-out vacuum cleaner and a jet fashioned from a hot water heater burner. Shortly after 1920 their experiments looked successful with an alloy of 70 copper, 25 lead and 5 tin, and impurities less than 0.2 per cent. But this was a long way from selling any of the stuff.

After some successful trials in speed boat engine bearings, the father and sons made a deal with the Fredericksen Co. in Saginaw to handle production and sale, but they had to supply a ton of the Sabeco metal first. An all-night session was productive of ten 200-pound heats and the metal was delivered. New applications were slow to develop but they finally started as the automotive, refrigeration, machine tool and other industries recognized the useful properties of the bronze bearings. The elder Agricola died in 1931 and it was not until 6 years later that the Saginaw Bearing Co. was organized, bringing H. W. Wishart, son of a refrigeration engineer, into the management picture. Over the ensuing 7 years, the company has prospered beyond the fondest dreams of the man whose ideas it carried to profitable fruition, and its progress is somehow a typical American story of industrial growth.

READERS' COMMENT . . .

More About Chinese Lion

To The Editors:

In the June issue of The Foundry I read the adventure of Bill and the Chinese lion with much interest and wondered if possibly the artist who illustrated the story is a Columbia man. His picture of the lion looks more like the Columbia animal than the actual Chinese object, which resembles a cross between the Sphinx and the famous wooden horse of the Greeks on the windy plains of Troy. Quite probably the Chinese designer of the huge casting never saw a lion. While I was a student at Columbia I traveled every day on the elevated railroad from Brooklyn and passed over the high columns on 110th Street. It never occurred to me that the columns were cast iron instead of the usual built-up rolled steel construction. Now I learn for the first time that they were cast by Jim Floyd in a New York foundry no longer in existence. I was interested also in the reference to the 200-ton ingot mold recently cast at the plant of the Bethlehem Steel Co., Bethlehem, Pa. However, I quite agree with Bill in his general argument that the Chinese lion is not the biggest casting ever made.

Thomas T. Read

Columbia University
New York

Cast iron statue of a lion built in China 953 A.D.

First Reader Class

To The Editors:

From the very beginning and up to the present The Foundry always has been a welcome visitor. I guess I have been and am one of the oldest readers. I can remember when the little book was the official monthly publication of the red card, or Brotherhood of Machinery Molders, organized and promoted for several years by a young Detroit molder, the late Mr. John A. Penton. The Brotherhood, an offshoot of the international union, later was merged with the parent body and Mr. Penton launched The Foundry as an independent publication, September, 1892.

I have been a continuous reader, although not always a personal subscriber. I have had charge of several shops where the magazine came to the front office and where it was circulated among department heads. However, I can safely say I have read The Foundry for over 55 years. I am now over 80 and expect to retire from active service in a short time, but I shall continue to read The Foundry with a great deal of interest until I drop the bottom for the last time, put away the tools and see the Paymaster about my back time.

Louis H. Knapp

3938 *Burwood Avenue*
Norwood 12, *O.*

Malleable Output

Malleable casting production in May totaled 70,123 tons, against 69,402 tons in April, 69,959 a year ago and 60,696 two years ago, according to reports compiled by the Department of Commerce. These figures do not represent the entire industry. Orders booked in May, less cancellations, amounted to 91,614 tons, compared with 87,727 tons in April, 77,768 a year ago and 54,219 two years ago.

The 12"-38" Adams Jolt Squeezer, Portable Type

Make Your Selection From This List

SIDE ROD TYPE PORTABLE OR STATIONARY	Squeeze Piston diameter	Jolt Piston diameter	Clearance between Side Rods	Pattern Draw, Adjustable
10"-32" Jolt Squeezer	10"	4"	32"	
12"-38" Jolt Squeezer	12"	5"	38"	
16"-42" Jolt Squeezer	16"	6"	42"	
10"-32" Universal Jolt Squeezer	10"	4"	32"	3" to 6"
12"-38" Universal Jolt Squeezer	12"	5"	38"	3" to 6"

Also Adams Hand Squeezers —30", 34" or 38" between side rods—Portable or Stationary.

THE ADAMS COMPA

MOLDING MACHINES · FLASK

The 10′ Post Type Universal Squeezer, Portable Type

Adams Molding Machines

POST TYPE
PORTABLE OR STATIONARY

	Squeeze Piston diameter	Jolt Piston diameter	Pattern Draw, Adjustable
10″ Post Type Jolt Squeezer	10″	4″	
12″ Post Type Jolt Squeezer	12″	5″	
10″ Post Type Universal Jolt Squeezer	10″	4″	3″ to 6″
12″ Post Type Universal Jolt Squeezer	12″	5″	3″ to 6″

Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators.

Y · DUBUQUE, IOWA · U.S.A.

QUIPMENT · Established 1883

ALUMINUM CASTINGS
Salvaged by Arc Welding

A LARGE percentage of the aluminum turret castings that previously had to be rejected due to porosity and hollow spots now are being repaired at the Glenn L. Martin Co., Baltimore, by a method evolved by Louis Barrett, tool design process engineer, in which the porous section is replaced with

After the porous section is removed by chipping or grinding, the area surrounding the cavity is preheated to 200 to 300 degrees Fahr. with a torch

welding metal. The surface defects in the casting first are removed by grinding or chipping out the porous material. The casting then is preheated to 200 to 300 degrees Fahr. either in a furnace or by application of local heat. Next the cavity is welded or filled with weld metal using a carbon

Weld is made with carbon electrode and a 5 per cent silicon-aluminum welding rod

arc and a 5 per cent silicon-aluminum welding rod. Finally the welds are cleaned and filed smooth.

Outstanding features are the preheating of the casting and the use of a carbon electrode in combination with the metal welding rod. The preheating simplifies the welding operation and lessens the possibility of cracks by lowering the temperature differential between the point of the weld and the surrounding metal. High heat at the point of weld is avoided. Use of the carbon electrode with a normal metal welding rod is claimed to provide a better adhesion between the weld metal and the aluminum casting than when the metal welding rod is used by itself as an electrode.

New method of repairing defective castings is limited in use to low stressed areas. Porosity or hollow spots are determined by x-ray and following the welding, the casting is again x-rayed to insure a perfect blend between the weld metal and the casting.

Not only does the method permit the rapid salvaging of castings that are needed urgently on the production line, but it is also resulting in the saving of considerable quantities of critical materal, and the many man-hours that already went into the making of the casting before it was discovered to be defective by the Martin receiving inspection department.

Emergency Action On Standards

On recommendation of certain standing committees the American Society for Testing Materials through its Committee E-10 on Standards recently has approved a number of actions involving Emergency Alternate Provisions relating to steel castings. These were issued April 26, 1944, and the important points follow:

EA-A95

The following Emergency Alternate Provisions, when specified, may be used as an alternative in A.S.T.M. Standard Specifications for Carbon-Steel Castings for Valves, Flanges, and Fittings, for High-Temperature Service (A95-41) and affect only the requirements referred to:

Section 5.—Change the carbon content from the present requirement 0.15 to 0.45 per cent to read 0.40 max. per cent.

Section 8 (a)—Change the table to read as follows:

Tens. Str., min., psi	65,000
Yield Pt., min., psi	35,000
Elong. 2 in., min., per cent	20
Red. Area, min., per cent	30

Section 10.—Change to read as follows:

When castings are purchased for use in accordance with American War Standard Pressure-Temperature Ratings for Steel Pipe Flanges, Flanged Fittings, and Valves, ASA B 16e5, each casting shall be tested after rough machining to the hydrostatic test pressure prescribed in the table below and shall show no leaks.

Primary service pressure ratings, psi	Standard hydrostatic test pressure, psi
150	350
300	900
400	1200
600	1800
900	2400
1500	4200
2500	7200

EA-A157

(Standard Specifications for Alloy-Steel Castings for Valves, Flanges, and Fittings for Service at Temperatures from 750 to 1100 Degrees Fahr.)

Section 10.—Change this section to read the same as Section 10 in Emergency Alternate Provision EA-A95 previously given.

EA-A216a

The following Emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Tentative Specifications for Carbon-Steel Castings Suitable for Fusion Welding for Service at Temperatures up to 850 Degrees Fahr. (A216-42T) and affect only the requirements referred to:

Section 1 (b).—Add two new grades of carbon-steel castings designated Grade EWCC and Grade EWCD suitable for welding for applications as pressure containing turbine castings, and a Grade EWCB to replace where acceptable Grade WCB for valves, flanges and fittings.

Section 5.—Add to Paragraph (a) the following requirements as to chemical composition for Grades EWCC, EWCD, and EWCB:

	Grade EWCC	Grade EWCD	Grade EWCB
C max., per cent	0.30*	0.35*	0.30*
Mn max., per cent	0.60*	0.70*	0.70*
P max., per cent	0.05	0.05	0.05
S max., per cent	0.06	0.06	0.06
Si max., per cent	0.60	0.60	0.60

*For each reduction of 0.01 per cent below the specified maximum carbon content, an increase of 0.04 per cent manganese above the specified maximum will be permitted up to a maximum of 1.00 per cent.

Add in Paragraph (b) the symbols EWCC, EWCD, and EWCB to the heading of the table, since the requirements of this section apply to the three new grades.

Section 8 (a).—Add the following requirements for Grades EWCC, EWCD, and EWCB:

	Grade EWCC	Grade EWCD	Grade EWCB
Tens. Str., min., psi	60,000	65,000	65,000
Yield Pt., min., psi	30,000	35,000	35,000
Elong. 2 in., min., %	24	20	20
Red. Area, min., %	35	30	30

Section 10.—Change this section to read the same as Section 10 in Emergency Alternate Provision EA-A95 given previously.

Section 16 (a).—Add the symbols EWCC, EWCD, and EWCB since the requirements of this section apply to the three new grades.

You Saw It in Buffalo—

Now You Can Use It in Your Own Plant

Prompt Delivery on The NEW "MASTER" ROTARY GRINDER

The last word in pneumatic grinder design—light in weight—good balance—plenty of power without vibration.

The new "MASTER" Grinder will help overcome your man-power shortage and turn out a full quota of work month after month with very low down-time.

THE "MASTER" Line Includes:

HAMMERS
FLOOR RAMMERS
BENCH RAMMERS
GRINDERS—
4, 6, 8 inch wheels
CHISELS
also
REBUILDING OF ALL PNEUMATIC TOOLS TO "MASTER" STANDARDS

NOTE THESE FEATURES

1. The only grinder with Hard Chrome Plated Cylinder—giving up to 3 times normal life.
2. Governor valve in rotor shaft minimizes end play.
3. Large oil chamber with external oil regulator insures positive lubrication.
4. Internal keyway on drive shaft minimizes shaft wear.
5. Manual or automatic trigger control for safety.
6. Quick, easy blade replacement.

Write for Descriptive Literature

MASTER TOOL COMPANY, INC.

The adventures of BILL

BY PAT DWYER

Drawings By RICHEY

I OFTEN have wondered," Bill said the other night, "why it is that a guy can sit around with a bunch of other guys and talk away for hours without the least effort and without turning a hair. Stick the same guy up on a platform with an audience in front of him and he breaks out in a sweat. His mind becomes a total blank and he could not repeat the alphabet or the Lord's prayer if the salvation of his immortal soul depended on the performance."

"How true," I admitted. "How embarrassingly true. However, why bring that up? The chances of either you or I ever finding ourselves perched on a platform gazing into a sea of expressionless, or at best indifferent faces, are exceedingly remote. Time enough, I always say, to cross a bridge when you come to it and not before."

"We're on it now."

"On what?"

"The old covered bridge, my boy. At least I am on the plank leading up to it. Through a series of unfortunate passes with the dice I have been elected to speak a piece at the first Fall rally of the shop group. I am supposed to give a play by play description of what I saw and heard at the Buffalo convention and exhibition of the American Foundrymen's Association. A new version of the old army game 'This little pig went to market, while the other little piggies stayed at home.'"

"O," I said. "That is a pig in a poke or a horse of another color or something. Just pick out a few of the high spots; do a few dozen words on each one and there you are!"

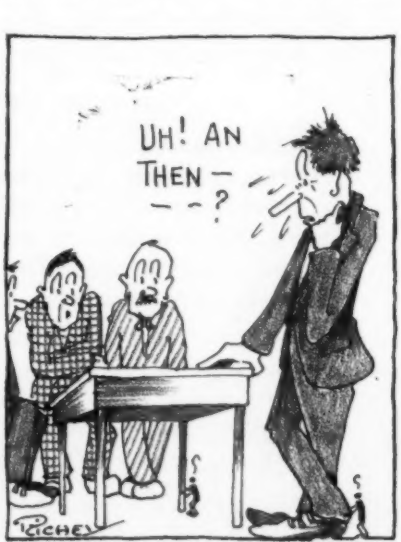
"Sure. There I am behind the 8-ball. When I stand up before that band of hecklers I won't be able to remember whether I was in Buffalo, Birmingham or Bellows Falls. Isn't there some kind of a book I can get that will show me how to go about this here now speech making business?"

"Dozens," I said. "Maybe hundreds of books on the subject. So far as I can gather from an occasional peep into some of them, they contain full directions on how to stand, how to breathe, how to articulate, how to use the gesture, and how to deliver the words with varying intonations, but I never have seen a book that teaches a man how to germinate ideas, clothe them in suitable language and keep them flowing in a constant, melodious and interesting stream. You either have the gift or you haven't.

"There is one type of mechanical speaking that any intelligent person can learn. I heard the method described one time by my chief, the late A. O. Backert. He was a great man, a great friend and a great teacher. At one time or another I have worked for many men, but never a one like him. God rest his loyal, lovable soul in the halls of Valhalla, where without doubt he is a shining light.

"The method is to take a word, any word, like picking a card out of the pack. Separate the letters. Take one letter at a time. Hang as many words as necessary on it. Pass on to each of the remaining letters in like manner, and presto, your speech is made. To illustrate his remarks he quoted the story of the professor from Yale who delivered one of these mechanical or synthetic addresses before the student body in a Mid-west university.

"With a nice display of teeth, carefully restrained gesture and correctly modulated voice he selected the first letter *Y* and told them all about Yale, founder, history, campus, athletic prowess, noted alumni, for a space of 15 minutes. Then he tossed the letter *A* in the arena and played with that for 15 minutes. *A*, he gravely informed the boys, stands for ambition, a very necessary factor for getting ahead in the world. Contrary to a widely circulated report, the *A* in the word Yale is not the source of the well known bar room ditty *Ale, Ale The Gang's All Here*. The vile canard first was set in motion by under graduate scuts from the lesser universities Harvard and Princeton. He did not need to remind them that the letter *L* was the first letter in the spark plug phrase *Let's Go*. He elaborated on this for 15 minutes and finally came to *E*. He was sure they were all aware of the fact that the letter *E* is the most widely used letter in the English language. He quoted extracts from Edgar Allen Poe's story *The Gold Bug* to remind the boys of how the investigator solved the cryptogram, by working from this foundation.



And then everything went blank

"After a 15 minute canter on this track he came under the wire calm and unruffled, and graciously accepted the applause of the audience. After the fashion of many public speakers he fished for some compliments. In many instances the egotism and self appraisal of the speaker is in inverse ratio to the performance. He asked one lad what he thought of the speech.

"'O,' this honest young lad made answer, 'the speech was so-so, but I certainly am thankful you did not come from the Massachusetts Institute of Technology, Cambridge, Mass., or the John Huntington Polytechnic Institute, Cleveland, O.'"

"That lad," Bill exclaimed in admiration, "has all the makings of a captain of industry. He knows what he wants when he wants it. I wonder if he knows how to spell Massachusetts? There is a stumper, if ever there was one. Almost any person can pronounce the word, but outside the natives of the Old Bay state, who have it drilled into them in their school days, I never have met a man who could distribute the s's and t's in proper order. Fortunately you can write Mass., and get away with it. Even more fortunately the initials M.I.T. are as well known as the full title of the famous school on the banks of the Charles river. However, we are drifting away from the question before the house. I don't think your first suggestion is so hot.

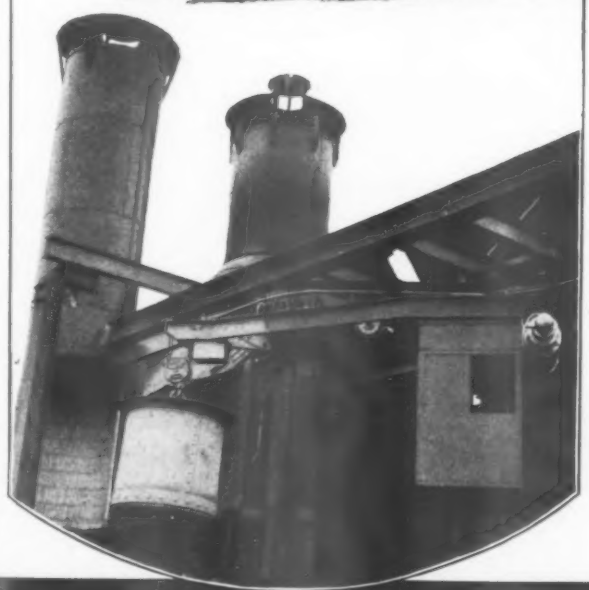
"Just suppose I adopted your plan and selected the word Buffalo to be taken apart, stretched out like an accordion, and then brought together again. If I were to start off with the letter *B* and explain that *B* stands for many things from butterflies and buttercups to bugles, bagpipes, bumbly bees and blue bottle flies, some low fellow with a distorted sense of foundry humor would be sure to remind me that the letter *B* also stands for bull and baloney. That kind of thing is apt to throw a fellow off his stride."

"You might try another method," I said, "to carry you over the bridge. Start off with a story. Introduce other bon mots or anecdotes as you go along and fill in the gaps with any kind of material that comes to mind—"

"Dash it all," Bill exclaimed, "that is where the hitch comes in. The story part is easy enough, but the other stuff, the tripe of filling material is beyond my

(*Concluded on page* 126)

GET BETTER METAL INTO THE FLASK *Faster!*



Scientific foundry practice demands control of all materials in the charge. Profits are determined by the cost of handling these materials. Both can be obtained by mechanical charging. When metal comes out of the cupola, quicker pouring into the flasks is assured with the aid of overhead handling. Flexible MonoRail arrangement insures safe handling at the cupola — quicker distribution of metal to pouring floor and increased speed of pouring. In foundries where speed, safety, efficiency and accuracy are of major importance — that's where American MonoRail equipment is usually found. Why not arrange for an American MonoRail Engineer to survey your requirements at no obligation?

THE AMERICAN MONORAIL CO.

13104 Athens Avenue ★ Cleveland 7, Ohio

(*Concluded from page* 124)

reach. That reminds me of a story a friend of mine from the West Coast told me one night when I ran into him in the hotel lobby in Buffalo. A light green sand molder prowling around in search of a job wandered into a shop where most of the castings were made in dry sand molds. When he braced the gaffer for a job, this dignitary asked him if he was accustomed to dry sand work. 'Well,' the lad hedged, 'I ain't exactly sure what you mean when you talk about dry sand.'

" 'You're not sure, hey,' says the boss, giving him the eye. 'I ain't got no time to stand here all day chewing the rag. Just answer yes or no when I ask you if you can make a mold in dry sand.'

" 'Well,' the feller says, 'guess I can make a stab at it if the sand is not too (naughty word) dry!' "

"I don't think," I said, "any person in the foundry is as dumb as all that."

"You don't, hey? Just give a listen to a letter I had some time ago:

Recently I have been appointed foundry sand salesman for a company which sells sand for various industrial purposes. The field is entirely new to me and although I have attempted to read up on the subject, I need further information. A core is made of sand, binder, core oil and blackening. What are binders and what is their purpose in a core? Why the blackening? What is core oil made of and just how does it function in a core? Why is it important that sand be coarse or fine? Can the same sand be used in making cores for gray iron, malleable, brass and steel castings? If not what is the best sand for each? Can you refer me to any books on sand and coremaking?

"His reference to attempting to read up on the subject," Bill remarked caustically, "inclines me to the opinion he is one of the modern bright young lads who think they are reading when they skim over the headlines and lap up the funnies. Well, anyway I wrote him like an indulgent father:"

Lacking a knowledge of all the circumstances and prevailing conditions, I am in no position to comment on the apparent anomaly of a man with no experience being allowed to tackle a highly specialized job, while presumably competent and available men are ignored. I admire your courage while I sigh pathetically and wipe away a silent, salty and rheumy tear over what experience would seem to indicate is another expedition up salt creek without a paddle.

A complete answer to your list of questions would involve the compilation of a volume closely paralleling in size and shape the well known *Anthony Adverse*, or *Gone With The Wind*. Fairly hefty tomes as you probably are aware if you tried to read either one without the aid of a small hoist to carry the weight while you turned the pages with a moistened thumb. The following brief answers to your questions in order of presentation may serve your immediate purpose: 1—A binder is any material employed to cement the grains of sand to each other. Binders—outside the natural clay bond—are divided into four main classes, oils, cereals, resins and pitch. These materials in various proportions are mixed with the sand, singly or in combination. When the core is baked in the oven, the binder connects the sand grains to form a firm, compact mass. In a homely illustration the binder in a core corresponds to the mortar in a brick or stone structure.

2—Blacking is the generic foundry term for plumbago, ground coal or coke, a little clay or other binder, mixed with water and applied as a wash to the mold or core surface. Blacking prevents the metal from adhering to the sand and produces a clean, smooth face on the casting. 3—Core oil is a compound of several materials, usually with linseed or other vegetable oil as a base. Purpose described in No. 1. 4—Size of the sand grains affects the surface finish of the casting. Obviously a coarse grain sand will not impart as smooth a surface as a fine grain. Size of the grain also is a factor in permeability, an item that requires a chapter by itself.

5—With certain qualifications, the answer is yes. However, the highest and most refractory grade is required for steel, next for iron, then the brasses and bronzes. A less refractory sand will serve for aluminum and magnesium. 6—Covered in a general way in preceding answer. 7—Cores and coremaking practice and materials have been discussed in THE FOUNDRY and in *Transactions* of the American Foundrymen's Association on almost innumerable occasions. A chapter in *Elementary Foundry Technology* is devoted to the subject. A recent comprehensive publication issued by the American Foundrymen's Association, *Modern Core Practice and Theories* carries the coremaking operation through from materials and mixing methods to final setting of the core in the mold.

Malleable Founders Elect Officers

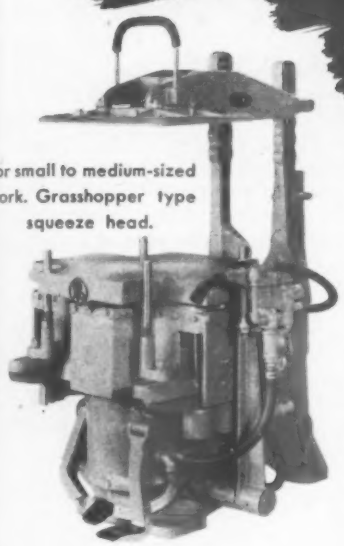
Anthony Haswell, president of the Dayton Malleable Iron Co., Dayton, O., was elected president of the Malleable Founders' Society at the organization's annual meeting held at Hot Springs, Va., June 15-16. Modification made at this meeting of the society's by-laws provides for an additional office, that of executive vice president, to which Haldwell S. Colby was elected. Mr. Colby recently was with WPB in Washington in connection with the foundry and forge program. He has had a long association with industry, his last position having been that of divisional vice president of the Baldwin Locomotive Works, Eddystone, Pa.

The following directors were re-elected: H. Nelson Albright, Columbia Malleable Castings Corp., Columbia, Pa.; R. N. Cole, Canton Malleable Iron Co., Canton, O.; L. A. Dibble, Eastern Malleable Iron Co., Naugatuck, Conn.; R. R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill.; C. A. Gutenkunst Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee; Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; W. J. MacNeill, Federal Malleable Co., West Allis, Wis.; C. H. McCrea, National Malleable & Steel Castings Co., Cleveland; K. M. Smith, Lancaster Malleables & Steel Corp., Lancaster, N. Y.

Newly-elected directors include: Frank S. O'Neil, Link-Belt Co., Indianapolis; Frank E. Shumann, Lehigh Foundries Inc., Easton, Pa.; James H. Smith, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

Old cronies meet in quiet hotel lobby and gleefully exchange bon mots of the good old open range days

SPO No. 200 SERIES *Molding Machines*



For small to medium-sized work. Grasshopper type squeeze head.

For medium to semi-heavy work. Complete shielding against sand.

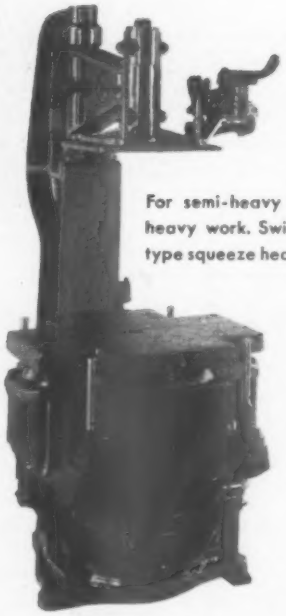
FOR FAST PRODUCTION OF GOOD MOLDS

Here is a group of jolt squeeze strip machines that produce—*but fast!* They waste neither time nor energy.

Place flask over pattern, fill with sand, jolt, press lever to squeeze and strip mold automatically, remove finished half mold.

Draw your pattern free as far as time is concerned. Squeeze on the up-stroke and draw your pattern automatically on the return down-stroke. SPO's patented self-aligning stripping mechanism insures a perfect draw, not only at the breakaway, but all through the operation.

The result:
more and better molds.



For semi-heavy to heavy work. Swing type squeeze head.

For heavy work. Note clean understructure.

Ask now for bulletin showing range and capacities of these machines.

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foundry DEVELOPMENTS

IN AN investigation to develop a flux degassing procedure for chill-cast tin bronzes for rolling W. T. Pell-Walpole in *Journal,* Institute of Metals (London) found that a fused mixture comprised of 34 parts by weight borax, 50 parts sand, and 20 per cent by weight cupric oxide gave good results. It is said that the flux does not attack the melting pots severely, is only slightly fuming at 1200 to 1300 degrees Cent. (2192 to 2372 degrees Fahr.), and easily thickened for removal from the melt so that slag inclusions are found rarely in the metal. Improved soundness and mechanical properties of the metal indicate that it has a considerable degassing action on the melt. Dried sand or fritted mixtures of 3 sand to 1 borax, or 3 sand to 1 sodium fluoride were the most satisfactory thickeners for the flux. Procedure is to charge flux with the metal (1 ounce per pound of metal), and when metal is molten flux is drawn aside and one-half of chosen deoxidant (0.05 per cent phosphorus as 15 per cent phosphor-copper) is added with the required amount of tin. After 10 to 15 minutes superheating, flux is mixed with metal, allowed to separate, thickened with dried sand, and removed completely from the surface of the metal. Remaining deoxidant is added, stirred well, metal skimmed, and allowed to cool to the casting temperature.

♦ ♦ ♦

TECHNIQUE for cutting cast iron with oxyacetylene differs from that for steel in that much higher preheat is required, and the cutting nozzle is moved back and forth constantly across the line of cut. Oxygen pressure required is from 25 per cent greater to twice as much as for cutting steel of the same thickness. Also the heating flames should be adjusted so as to have an excess of acetylene rather than to be neutral as they are for steel.

♦ ♦ ♦

Typical resin sand mixture for cores for magnesium alloy castings which is said to have good workability and adequate physical properties plus good shakeout properties is comprised of washed and dried silica sand 70 A.F.A. fineness number; urea-formaldehyde resin 0.75 per cent; cereal binder 0.75 per cent; sulphur 0.75 to 1.0 per cent; boric acid 0.50 per cent, and moisture 3 to 6 per cent. Baking temperature is from 300 to 350 degrees Fahr. Typical physical properties are given as green permeability 90; green compression 1.2 pounds per square inch; dry permeability 110; dry tensile strength 180 pounds per square inch; transverse strength 30 pounds, and scratch hardness 75.

♦ ♦ ♦

IN A STUDY of use of steel scrap additions to the charge and use of inoculants to produce a high strength cupola iron, W. Barnes and C. W. Hicks in a paper presented at the annual meeting of the Institute of British Foundrymen found that increasing additions of steel scrap up to 70 per cent (the limit of the study) resulted in steady increase in tensile strength from the base of approximately 32,500 pounds per square inch up to 41,700 to 43,250 pounds per square inch. Additions 60 ounces per ton of inoculants such as ferrosilicon, calcium silicide, aluminum-silicon resulted in further increases of 2000 to 7000 pounds per square inch. Tests with a 60 per cent steel mixture and varying amounts of inoculants indicated that peak increase in tensile strength was obtained with additions of 40 ounces per ton. Aluminum-silicon inoculant was one developed by the authors and composed of 7 parts of 80 per cent ferrosilicon and 3 parts aluminum swarf (fine chips and borings), mixed and ground together to pass a 16-mesh sieve. The aluminum and silicon were not alloyed.

♦ ♦ ♦

NUMEROUS factors must be considered in designing the gating system for producing satisfactory castings. These include study of portions of the casting which are critical with respect to pressure tests or perfection of machined surface; relative fluidity of the alloy; pouring temperature; speed of pouring and hydrostatic head to be maintained; whether strainer cores or choke gates will be used; number of pieces on the pattern plate and their location; how many molds will be poured from one ladle or pot of metal, and the rate of loss of temperature or fluidity during pouring.

♦ ♦ ♦

ACCORDING to the Corn Industries Research Association in a recent publication entitled, "Corn Facts and Figures", the foundry industry is one of the large industrial consumers of corn. Information given states that over 110,000,000 pounds of corn flour and dextrin were used in the production of ferrous and nonferrous castings.

♦ ♦ ♦

FACTORS involved in the proper quenching of cast steel include: Surface per unit of volume; size and shape of casting; temperature of water; temperature of casting when quenched; diffusivity of casting; surface condition of steel; liberation of gases in bath; methods of introduction into the bath, and circulation and agitation of the bath.

♦ ♦ ♦

LARGE additions of manganese to gray iron and to pearlitic malleable iron often result in formation of pinholes which are not attributable to melting and casting practice according to U. S. Patent No. 2,333,741. The patent points out that such pinholing may be eliminated through use of iron oxide, nickel oxide or chromium oxide added in conjunction with the ferromanganese. The amount of iron oxide to be used should be determined empirically for the specific conditions encountered, and may vary from 0.25 to 10 per cent of the manganese addition. Instead of adding iron or other oxide, satisfactory results can be obtained by oxidizing the ferromanganese by subjecting it to high temperatures in an oxidizing atmosphere.

MICRORADIOGRAPHY, a new word in the foundry lexicon is not quite so formidable as it sounds since it simply means examination of radiographs or x-ray film under the microscope. Radiographs are made on thin slices of aluminum and magnesium ranging from 0.005 to 0.050-inch thick which are cut from the casting with a thin abrasive saw, and examined without any further preparation. After development the radiographs are placed under the microscope for examination from 2 to 200 diameters depending upon the type of film used; the higher magnifications being employed with the specially sensitized, fine-grain film. Magnification of the defect as shown by the radiograph permits differentiation between gas trouble, shrinkage, slow cooling, absence of refining agents, etc. in light alloys. Procedure also can be used for brass and bronze.

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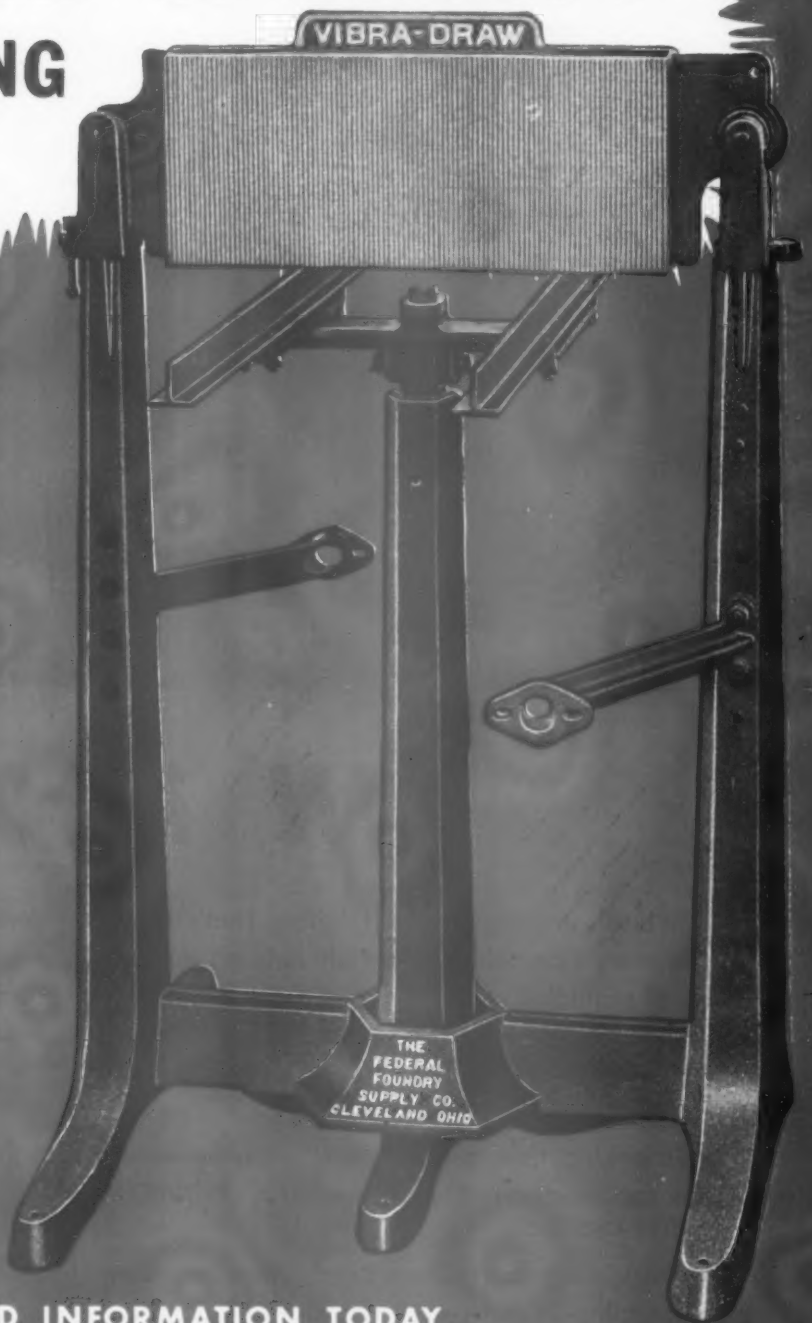
CORE DRAWING MACHINE...



FAST...

Designed for speed, the Vibra-Draw Core Drawing Machine will definitely increase production in your core room. Production schedules can be maintained even with inexperienced operators.

ACCURATE

The core box is drawn against machined grooves (not cast). Accuracy is ensured for the entire height of the draw and every core will be true-to-box.

EFFICIENT

All the vibration is in the drawing head—none on the core tray. The stand supporting the core tray is independent from the balance of the machine. Cores already made will not "shake down" while others are being drawn on the same tray.

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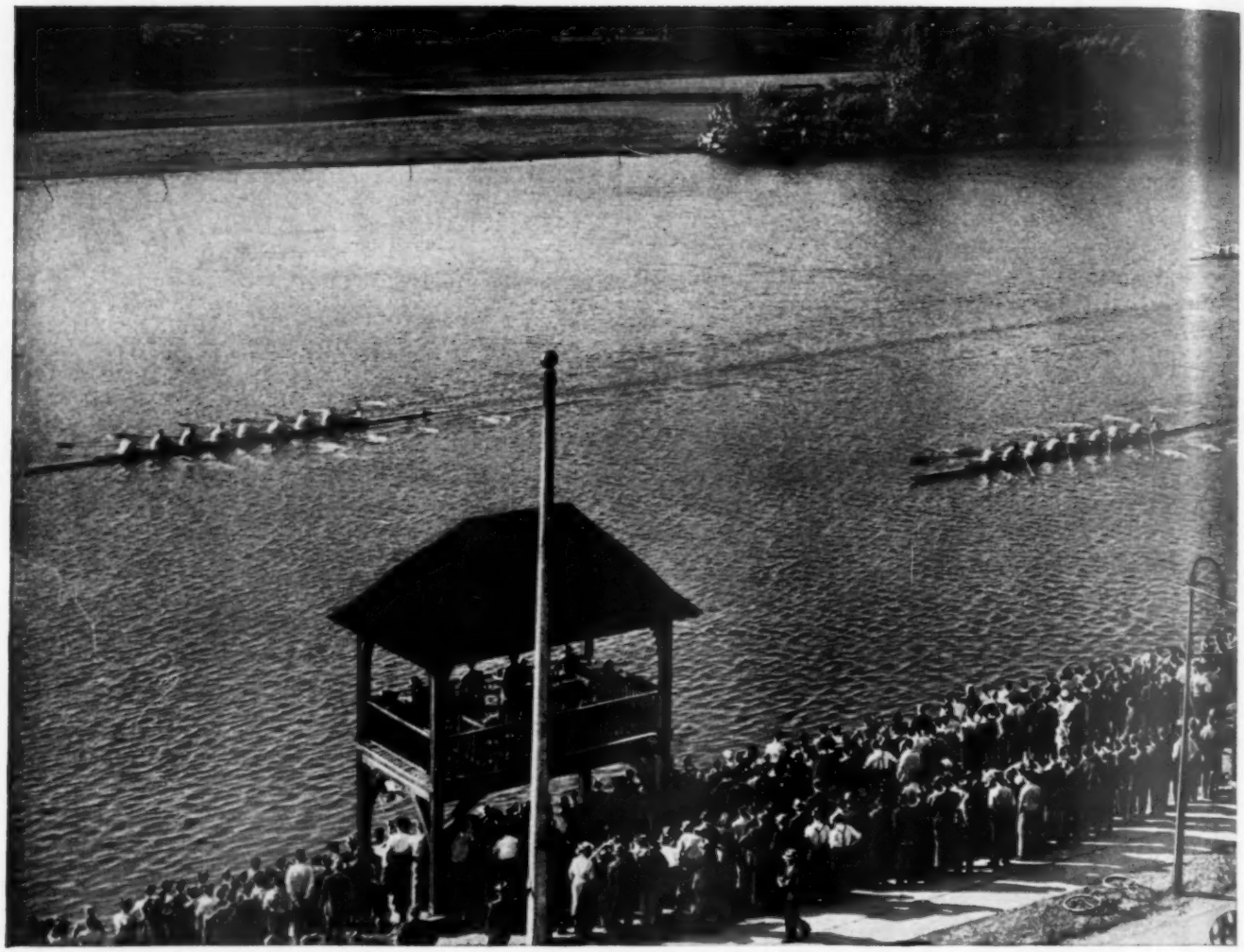

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Eight backs stroking in perfect rhythm. That's teamwork; every man pulling his weight to bring victory. Back of profitable casting production is more teamwork—good men using good methods working with good materials.

MOGUL CEREAL BINDER . . . *saves binder costs;* reduces baking time and cleaning costs; increases oven capacity and core production . . . PRODUCES QUALITY CASTINGS.

MOGUL is a perfect Green Bond, which increases permeability in cores and bonds. MOGUL can be used in cores when both green and dry strengths are required.

MOGUL works with core oil, because it decreases drying time, and produces smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sand.

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activities of foundry

GROUPS

Northern California

ANNUAL meeting and Ladies Night of the Northern California Chapter, A.F.A., was held at the Claremont Hotel, Berkeley, June 9. Following the dinner, President Harry A. Bossi stated that at a recent meeting the directors had accepted a full and satisfactory report of the year's activities. He mentioned in particular that the chapter's finances were in good shape and that addition of 58 new members brought the organization's membership to 267.

Proceeding with the most important business of the annual meeting the following officers were elected for the coming year: President, Ralph C. Noah, San Francisco Iron Foundry; vice president, Alfred J. Snow, Snow & Galgiani; secretary-treasurer, George L. Kennard, Northern California Foundrymen's Institute. Directors elected for 2 years include: H. A. Bossi, H. C. Macaulay Foundry Co., Berkeley; J. B. Bubb, Joshua Hendy Iron Works, Sunnyvale; William Leishman, Pacific Brass Foundry; A. M. Ondreyco, Vulcan Foundry Co., Oakland.

Before the meeting was turned over to the entertainment chairman, Charles R. Marshall, a gift consisting of a desk pen and a pair of beautiful book ends was presented to Mr. Bossi by S. D. Russell, past president, and F. A. Mainzer, acting for the membership.

The evening's program was concluded with dancing and other entertainment.—*George L. Kennard, secretary-treasurer.*

New England

AN INTERESTING discussion on foundry material handling equipment was heard at the June 14 meeting of the New England Foundrymen's Association held at the Engineers' Club, Boston, with an attendance of approximately 90 members and guests. The speaker was Walter S. Giele of the Walter Giele Co., Lebanon, Pa., foundry engineering concern.

Association president T. C. Weiser announced that a committee had been appointed to make plans for the annual outing to be held Aug. 9. The meeting then was turned over to R. F. Harrington, who introduced the speaker. Mr. Giele showed numerous slides to illustrate the latest type of foundry equipment. Discussing cranes he pointed out that they should be selected according to the requirements of the plant, and indicated the range in hoisting speed and in bridge and trolley travel available. Advantages and disadvantages of different types of wall cranes were explained, and the correct use of hand and power operated hoists was described.

It is necessary to use considerable care in designing loading platforms for freight cars and trucks in order that correct height be assured. Trucks also should be checked on overall height of loads to clear bridges, power lines, etc. Various types of industrial trucks were discussed from the standpoints of use, initial cost and maintenance costs. In illustrating different types of chain hooks it was mentioned that a properly designed hook will give warning of approaching failure by a gradual straightening. In purchasing a magnet it is necessary to make a careful study of its intended use before specifying the type, size and capacity.—*Merton A. Hosmer, vice president.*

Western New York

ANNUAL meeting and election of officers of the Western New York Chapter of the A.F.A. was held June 17 at the Hotel Buffalo with an attendance of approximately 250 members and guests. Since there were several nominations from the general membership in addition to the slate presented by the nominating committee, a general election by ballot was held. Polls were open from 5 to 7 p.m.

Dinner was served at 7:30 p.m., after which Chairman Frank E. Bates presided at a short business meeting. Following reports by various officers and committee chairmen, Elliot R. Jones presented Mr. Bates a pin made up with the A.F.A. insignia and set with a diamond in the center. Mr. Jones also announced that similar pins would be presented to all former chairmen at the first fall meeting.

The tellers then reported the following officers and directors elected for the 1944-45 term: Chairman, Reinhold D. Loesch, Lake Erie Foundry Co.; vice chairman, Arthur H. Suckow, Symington-Gould Corp., Depew, N. Y., secretary, J. Ralph Turner, Queen City Sand & Supply Co.; treasurer, Martin W. Pohlman, Pohlman Foundry Co. Inc. Frank E. Bates, Worthington Pump & Machinery Corp., was elected a director for 1 year, and the following were named directors for 3 years: Milton S. Finley, Werner G. Smith Co.; Harold R. King, Metal & Alloy Specialties Co., and Harold J. Struebing, Electro Refractories & Alloy Corp.

The new officers and directors were presented to the gathering, and Chairman Bates turned over the gavel to Chairman-elect Loesch, who made a brief acceptance speech. At the conclusion of the business session the members were entertained with a show arranged by the entertainment committee.—*J. Ralph Turner, secretary.*

Southern California

SOUTHERN California Chapter of the A.F.A. held its regular monthly dinner meeting, June 16 at the Los Angeles Elk's Club. The meeting was directed by Walter F. Haggman, Foundry Specialties Co., the retiring president for 1943-44, who introduced the president for the coming year, W. D. Bailey, Jr. Westlectric Casting, Inc., who was elected at the meeting of May 19.

Following reports of committee chairmen, the past presidents since organization of the chapter in 1937, all of whom were present, were called upon for remarks. Plans were announced for the annual summer party to be held Aug. 8 at the Lakewood Country Club. Retiring president Haggman was presented with a ring by the chapter in appreciation of his services during the past year and the successful manner in which he has conducted the monthly meetings.

The principal speaker of the evening was Arthur R. Hinkle, industrial radiologist of the Burk Laboratories, Los Angeles. Mr. Hinkle presented an informative lecture on "Fundamentals of X-Ray Inspection," stressing the application of radiology to the foundry industry. The lecture was illustrated profusely by lantern slides, and provoked much comment and many questions from the audience.

Mr. Hinkle is a charter member of the Los Angeles Chapter of the American Industrial and X-Ray Society Inc., and was associated with the General Electric X-Ray Corp. for 10 years.

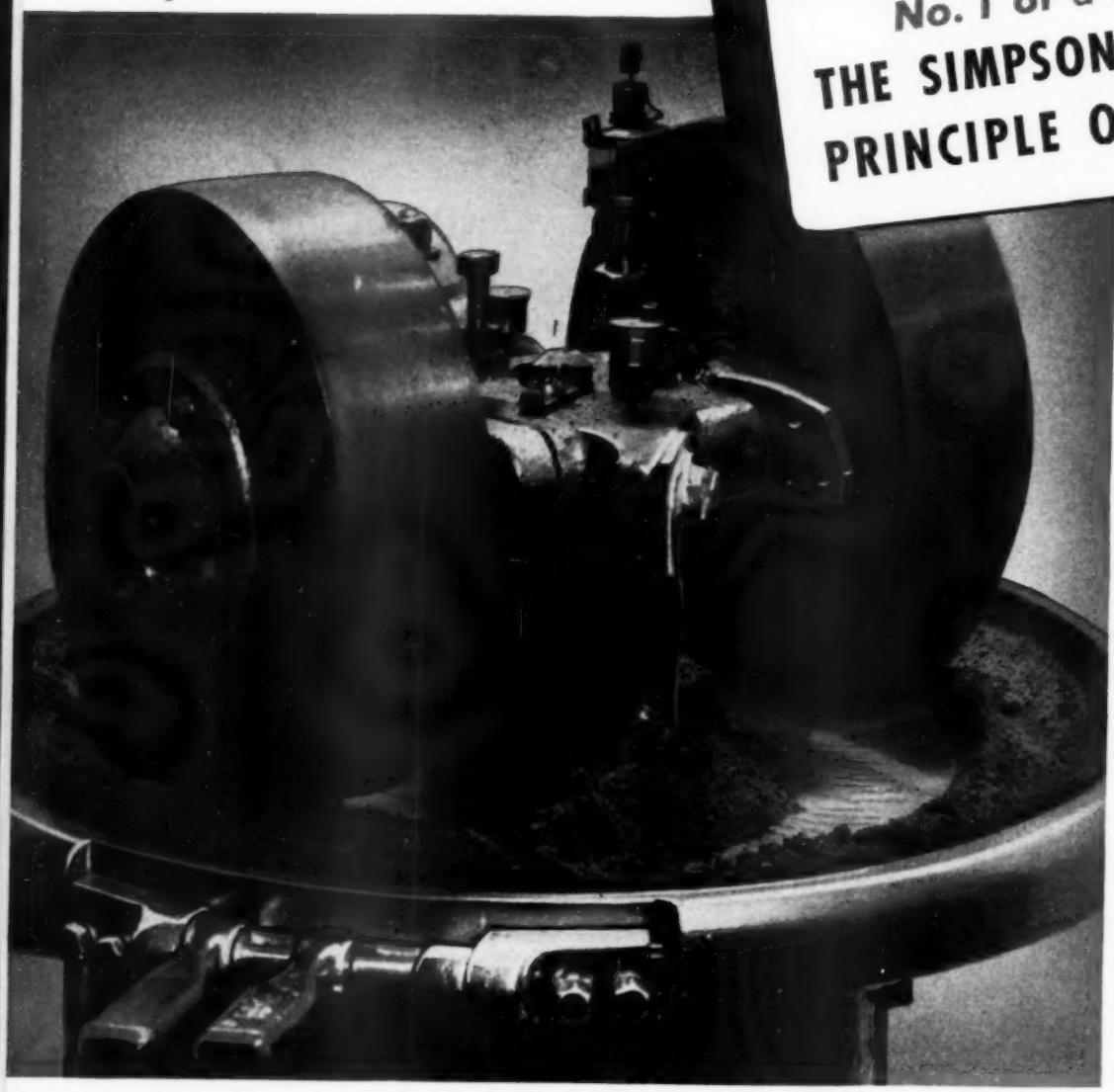
Also shown during the lecture period was a colored sound x-ray film which had been produced under the speaker's direction by the General Electric X-Ray Corp., as a sequence for *Popular Science Monthly*. Mr. Hinkle explained that exploration in the field of moving x-ray film was in its infancy in this country, and that its development promised tremendous advances in the fields of medicine and surgery as well as in machine technology.

Chairmen of committees appointed for 1944-45 at the meeting are as follows: Program, E. M. Hagener, General Metals Corp.; House, L. W. Beebe, Ingersoll-Rand Co.; Finance, James H. De Wald, Bell Foundry Co.; Membership, J. M. Crawford, Chamberlain Co.; Entertain-

(*Concluded on page* 134)

SIMPSON MIXERS the foundation

No. 1 of a Series
THE SIMPSON MULLING PRINCIPLE OF MIXING



LEFT:

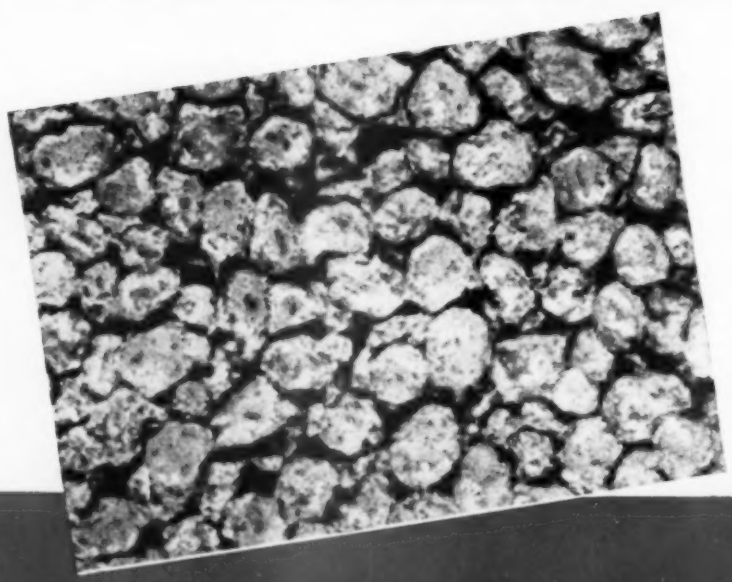
Closeup of special laboratory Simpson Mixer equipped with glass crib. Note ripples in track of muller indicating sideways as well as forward smearing — a sure sign of true mulling action.

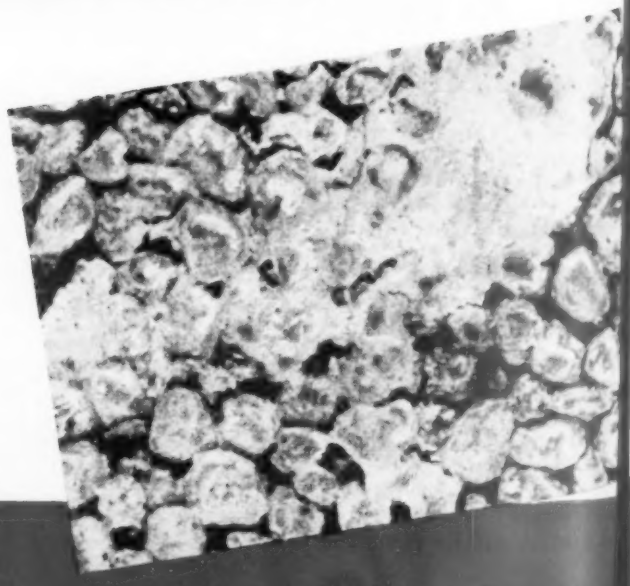
BELOW LEFT:

Microphoto of sand prepared in Simpson Mixer. Note even and equal bond distribution covering each sand grain. This sand will make a good casting.

BELOW:

Microphoto of sand which has been improperly prepared. Result of the lack of smearing action as achieved solely in the Simpson Mixer.





# of better sand control . . .

OVER THIRTY YEARS AGO the first Simpson Intensive Mixer introduced the advantages of mulling foundry sand in batch mullers. Since then all foundries have come to generally accept this proven principle of mixing and the Simpson Mixer. Today the great major part of all sand conditioned by mullers is handled in Simpsons—and four of every five new mullers installed are Simpsons. The reason for such universal acceptance is this: ***Simpson Mixers produce the maximum capacity of properly prepared sand at the lowest net cost per ton.***

The foundry's acceptance of mulling has, in some cases, developed the incorrect idea that any machine with wheels in it is a muller. The facts are that time and experience have proven the Simpson principle of mulling and uncovered the weakness of others. To develop this analysis, let us ask "what is mulling as applied to foundry sand?" It is an action best described as the application of weight, together with a smearing or skidding action.

Experience shows that no other known action will as completely coat each and every sand grain with bonding material and still not destroy the grain structure. Other processes may approach this procedure but Simpson mullers, rolling forward and also turning sideways in a short circular radius around the central shaft, fully achieve this true mulling or smearing action. Merely rolling the sand under a muller achieves an action where weight per square inch of muller face is the sole factor, and only part of the required work is accomplished.

In brief, the Simpson Mixer with its wide-faced mullers, accomplishes with mechanical efficiency the practice of the early molders when they "trampled" the sand, twisting forward and sideways on the ball of the foot, thereby "conditioning" the sand. As mechanical applications have been improved over the years Simpson Intensive Mixers have kept pace, but the basic and proven principle of mulling action does not change.

Engineers of National have experimented continually with all types and kinds of mullers with the purpose of developing the most efficient and desirable design. Nothing so far in National's thirty years of experience in the field of foundry sand preparation has indicated a major change in principle.

Install Simpson Intensive Mixers in your foundry so that you may have the full and complete advantages of the true basic mulling principle and all resulting benefits, including low cost, maximum capacity and quality of product.

Two views of a No. 2 Simpson Mixer in action—note that the muller rolls and turns, smearing the sand with its forward-sideways action. Note also the plows which turn the sand over and over feeding it into the mullers. Here is positive and true mulling.

National Engineering Service

For more than 30 years National Engineering and Field Service, has helped hundreds of foundries solve problems in sand preparation, reclamation, handling, storage and control. Today, National Engineers are constantly on the job helping foundries with problems of sand handling and control on construction, maintenance, repair or new requirements. National Engineering and Field Service is available and eager to help you whenever and wherever you need it.

National Field Service

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(*Concluded from page* 131)

ment, William D. Emmett, Los Angeles Steel Casting Co.; Custodian, Henry Howell, Howell Foundry; Publicity, Richard H. Hughes, Almquist Bros. & Viets; Apprentice Training, Robert Gregg, Reliance Regulator Co.—*Luther Whiteman.*

Twin City

A M. FULTON, Northern Malleable Iron Co., St. Paul, was chosen chairman of the Twin City Chapter of the A.F.A. for 1944-45 at the annual election of officers held at the monthly meeting May 25. Other officers selected include R. C. Wood, Minneapolis Electric Steel Castings Co., Minneapolis, as vice chairman, and Alexis Caswell, Manufacturers' Association of Minneapolis Inc., Minneapolis, as secretary-treasurer.

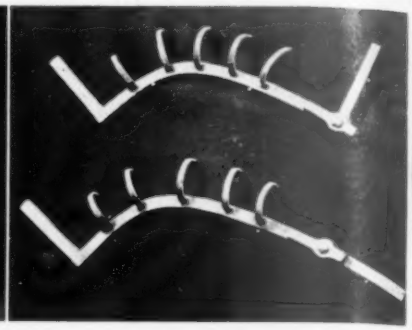
Book Review

Handbook of Chemistry, by N. A. Lange, fabricoid, 2092 pages, 5⅜ x 7¾ inches, published by Handbook Publishers Inc., Sandusky, O. Price $6.

During the three years since presentation of the previous edition of this compendium of information on chemistry and allied fields, numerous changes have occurred, and in this the fifth edition, the author has endeavored to bring all data up-to-date. A number of new tables have been added to the extensive list, and many of the tables previously published have been extended or in some cases rewritten. New tables include a periodic table, flammable liquids, flame temperature, plastics, fluorescence of chemicals, minerals and gems, and waters for industrial use. Addition of the new tables and extensions of the old have increased the number of pages 174 over those in the fourth edition. While compiled primarily for the chemical field, the metallurgist and engineer will find it handy.

GREEN SAND CORE SET

In Mold Drag by Corebox

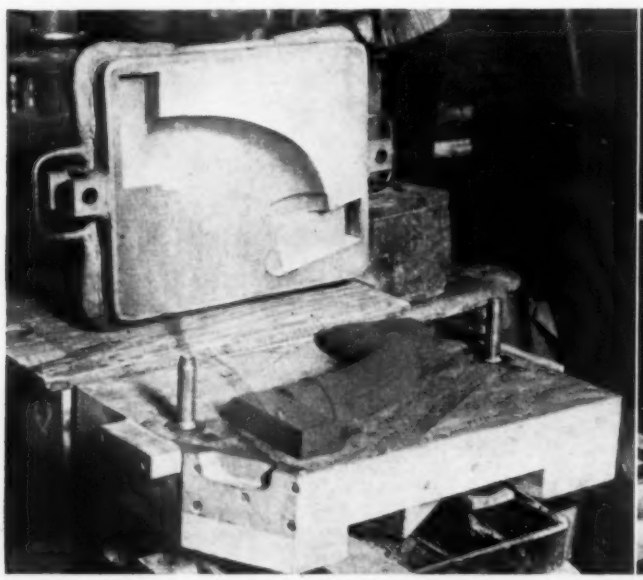


METHOD shown in the accompanying illustrations is practiced in a British foundry for the production of aluminum alloy, tubular castings 12 inches in length, 3½ inches in diameter, and metal thickness ⅛-inch except at the ends where the thickness is 5/16-inch.

Cope and drag are made in the usual manner on a molding machine. The distinctive feature of the process is that the drag is lifted from the machine and placed on the half corebox containing the green sand core. This assembly is rolled over and placed on the floor. The half corebox is removed, leaving the core resting accurately in the drag. One half of the corebox is fitted with pins similar to those on the pattern plate, while the other half is provided with pin holes. The two halves of the corebox set up side by side are filled with green sand, rammed and struck off and then brought together to form a complete core. A cast arbor with projecting nails bent to the contour of the box is enclosed in the upper half of the core as made, but which becomes the lower or drag half of the core when the assembly is rolled over.

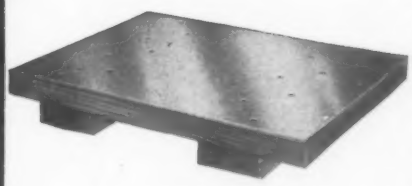
When the green sand core is ready, the upper half of the corebox is removed and replaced by the drag mold. The assembly then is rolled over and placed on the floor, where the remaining half corebox is removed. The cope then is placed on the drag to complete the mold. By extending the coreprints the core becomes self supporting and does not require any chaplets.

Castings made in these molds are accurate in shape, free from any overlapping at the joint and consistently even in metal thickness. A considerable saving in time is effected over the usual method of making hard, dry sand cores and fitting them in the mold by hand. On account of the bend at one end, a one-piece core arbor could not be removed from the casting. By providing a core arbor jointed to swivel at one end, the arbor can be removed readily. The use of green sand cores saves the cost of 5 tons of prepared oil sand cores on each batch of 1000 castings.



CMD FOUNDRY SPECIALTIES

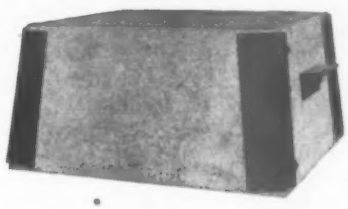
Save Time and Reduce Costs



CMD FIRE-RESISTANT BOTTOM BOARDS

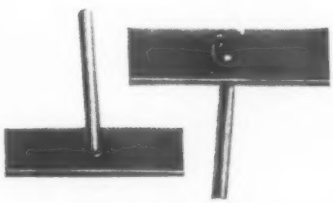
CMD WOOD FLOOR FLASKS

TRI-PLY FOUNDRY RIDDLE



CMD NON-WARP, NON-BURN COMPOSITION JACKET

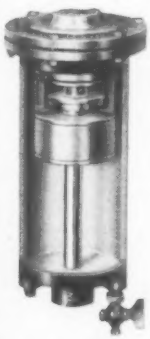
CMD WOOD BOTTOM BOARD



SLAG SKIMMING AND RABBLING IRONS

CMD TYPE A CHIPPING HAMMER
Combination drift and chisel

CMD TYPE C CHIPPING HAMMER
For general hand chipping



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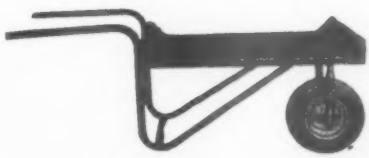
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



CMD PNEUMATIC CORE BARROWS
With single wheel (as shown here) or two wheels

CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

Foundries have been relying on CMD for time-saving, labor-saving supplies and equipment for 23 years. Write now for catalog on the complete CMD line!

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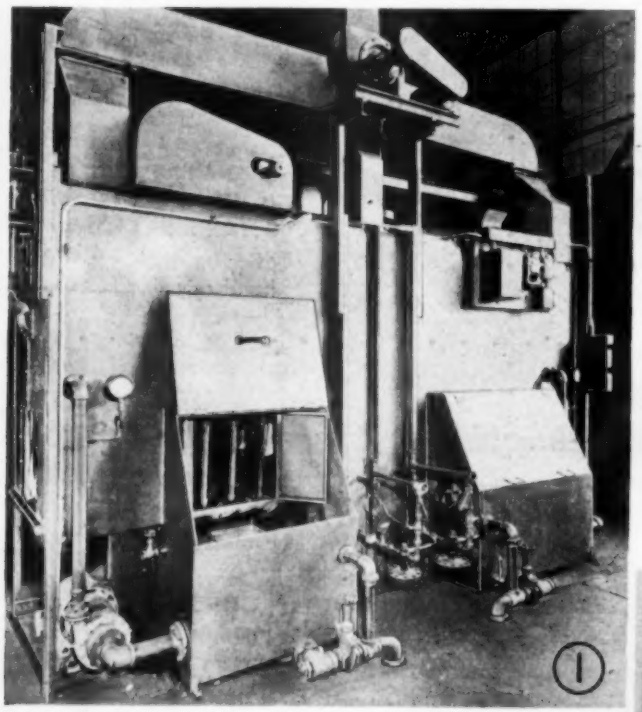
NEW EQUIPMENT & SUPPLIES

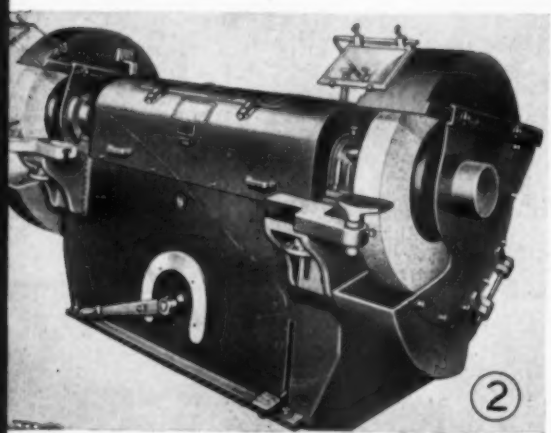
(1)—Spray Washer: American Foundry Equipment Co., 555 Byrkit Street, Mishawaka, Ind., announces a new and improved design in metal washing equipment designed to handle metal parts which must be rotated while passing through the cleaning chamber. A monorail conveyor carries the work suspended from hooks through the path of well positioned power sprays. Accessibility of all working parts is an important feature. The high pressure pumps are easily serviced. Additional units for drying and rust proofing easily may be added. The unit can be equipped for heating with steam, gas coils or electric immersion heaters.

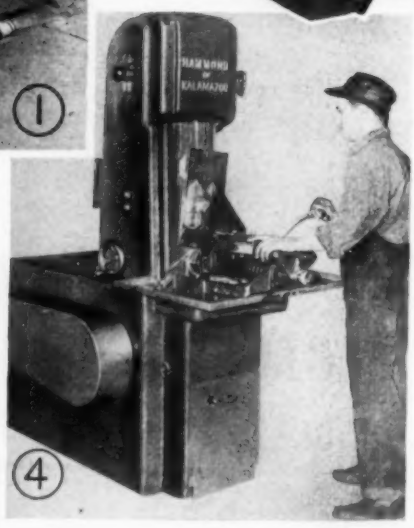
Thermostatic controls are supplied; to carry away steam and vapors, a well-proportioned duct work is located at the top of the cleaning unit.

(2)—Snagging Grinder: United States Electrical Tool Co., Cincinnati, has developed a heavy-duty, gear-driven snagging grinder designed to meet the need for additional power, and is available in horsepower units from 30 to 40. The variable speed enables the operator to maintain peripheral speed for the full life of the wheel through semi-enclosed constantly lubricated gear reduction. Rapid change of speed is effected through foot pedal and shifting lever. The speed lever is interlocked with guards which makes it impossible to increase speed unless wheels are worn down sufficiently to justify speed change, also prevents operation unless gears are in mesh. Control is push button with overload protection and low voltage release. Boiler plate adjustable wheel guards with exhaust connection are standard equipment.

(3)—Portable Screen: Simplicity Engineering Co., Durand, Mich., has developed a portable screening unit for use in foundries that are not equipped with sand handling systems. Handling heap sand before tempering, it is claimed the machine will take care of all the sand two men can shovel into it. The machine is operated by a 3-horsepower motor. Screen and aerator are driven by one set of V-belts, thoroughly guarded to prevent accidents. Flat steel stock blades can be replaced quickly and at little cost. The machine is mounted on three roller bearing wheels (pneumatic tires if specified) and moves easily on the foundry floor. All working parts are enclosed. Shoveling height is 25½ inches, overall width 40¾ inches, overall length 7 feet, 4¾ inches.







(4)—Belt Grinder: Hammond Machinery Builders, Inc., 1605 Douglas Ave., Kalamazoo 54, Mich., offers a new wet and dry grinder carrying an abrasive belt up to 10 inches in width and capable, it is claimed, of surfacing or finishing many jobs faster and better than the work can be done on many other types of machine tools. The abrasive belt can operate to the edge of the belt

(*Continued on page* 138)

A Real Money Saver for Your Core Room....

CERTIFIED *Rapidry* Core Oil is furnished in several grades to produce maximum efficiency at minimum cost under any foundry conditions and with any type of sand; no matter what kind of metal you pour or how large, small, or intricate the cores and castings may be.

GUARANTEE—Just inform us fully of the grade of oil you now use, and we will ship you a trial order of our *Rapidry* Core Oil to use at exactly the same ratio in your sand, and on the understanding that it will produce all the improvements stated in this advertisement or the shipment may be returned for full credit.

COST—*Rapidry* Core Oil costs considerably less than conventional core oils, and is positively guaranteed to run uniform in quality.

WORKABILITY & CRUSTING—*Rapidry* Core Oil mixes evenly, quickly, and thoroughly in the sand, works extremely smooth in the boxes, and will not crust as readily when mixed with sand and left lying on the benches.

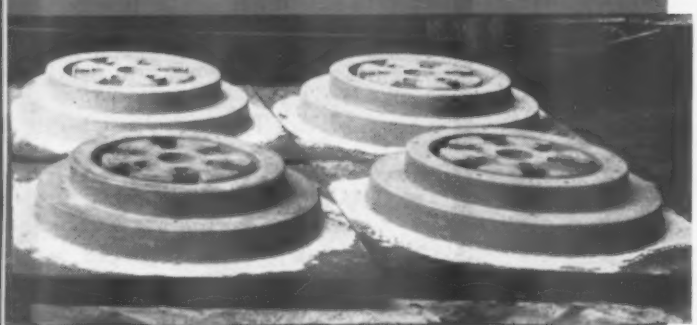
QUICKER DRYING—*Rapidry* Core Oil dries quicker in the oven or at lower baking temperature.

COLLAPSIBILITY—*Rapidry* Core Oil produces very readily collapsible cores.

SMOKE AND GAS—*Rapidry* Core Oil produces absolute minimum of smoke and gas, either in the core room or in the foundry when the metal is being poured.

STOCK CORES—Cores made with CERTIFIED *Rapidry* Core Oil can be safely put in stock without fear of absorbing moisture.

We suggest that you place a trial order with us on the definite guarantee stated above in order to run a regular foundry test to prove the statements made in this advertisement.

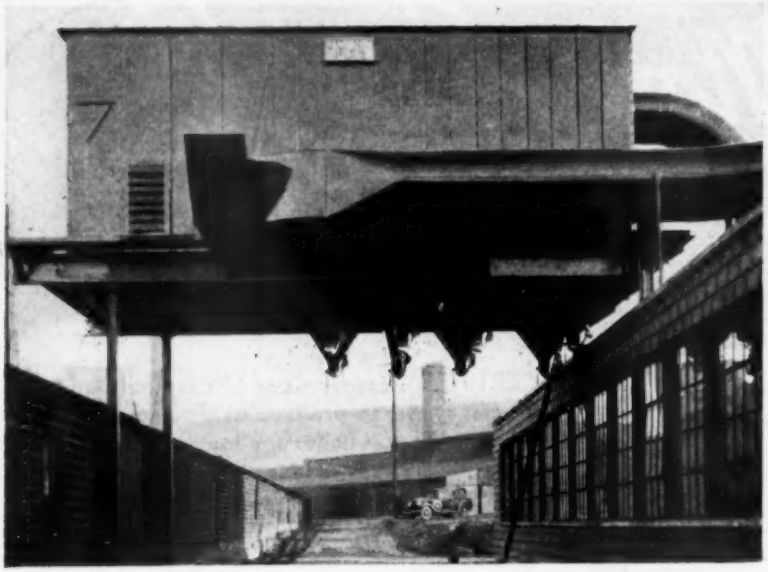


CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

3308-26 South Cicero Avenue, Cicero, Illinois

Stock and Representatives: Buffalo, N.Y. Elmira, N.Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. Milwaukee, Wisc. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn. Portland, Ore.



PANGBORN DUST-CONTROL SYSTEMS DESIGNED FOR

➡ ECONOMY
➡ CONVENIENCE
➡ SERVICE

When Pangborn engineers tackle your dust problems—they have three goals in mind. First your needs must be answered as economically as good engineering dictates. Next, the job must be arranged for maximum convenience, both in placing of collector and arranging for easy unloading of collected dusts. Finally, the installation must be designed to give most efficient operating service possible—overcoming all dust hazards and problems—freeing your mind of all dust worries.

NATIONAL SECURITY AWARD

ARMY-NAVY

PANGBORN

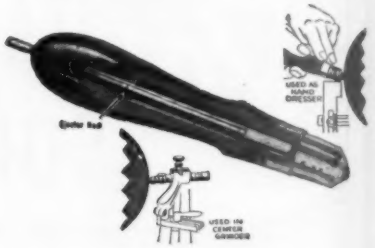
WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

(*Continued from page* 136)

backing plate where clearance is provided for getting into corners. The machine will accommodate various size tables. The number of special work holding fixtures is unlimited. The standard type is equipped with either plain or oscillating table. The oscillating table has a micrometer stop graduated in 0.001-inch for accurately controlling depth of grind and has three T-slots for attaching fixtures. The idler pulley is mounted on a heavy column which incorporates a built-in automatic belt tensioning device. Large capacity coolant tank is located in the base and adequate controls are provided for wet grinding operations. Exhaust connection is provided for dry grinding.

Wheel Dresser: Diamond Tool Co., 938 East 41st Street, Chicago 15, announces a new double purpose diamond dresser tool known as the Handl-Nib which can be used for hand and machine dressing. The new tool has an ejector type handle in combination with a big head diamond nib held

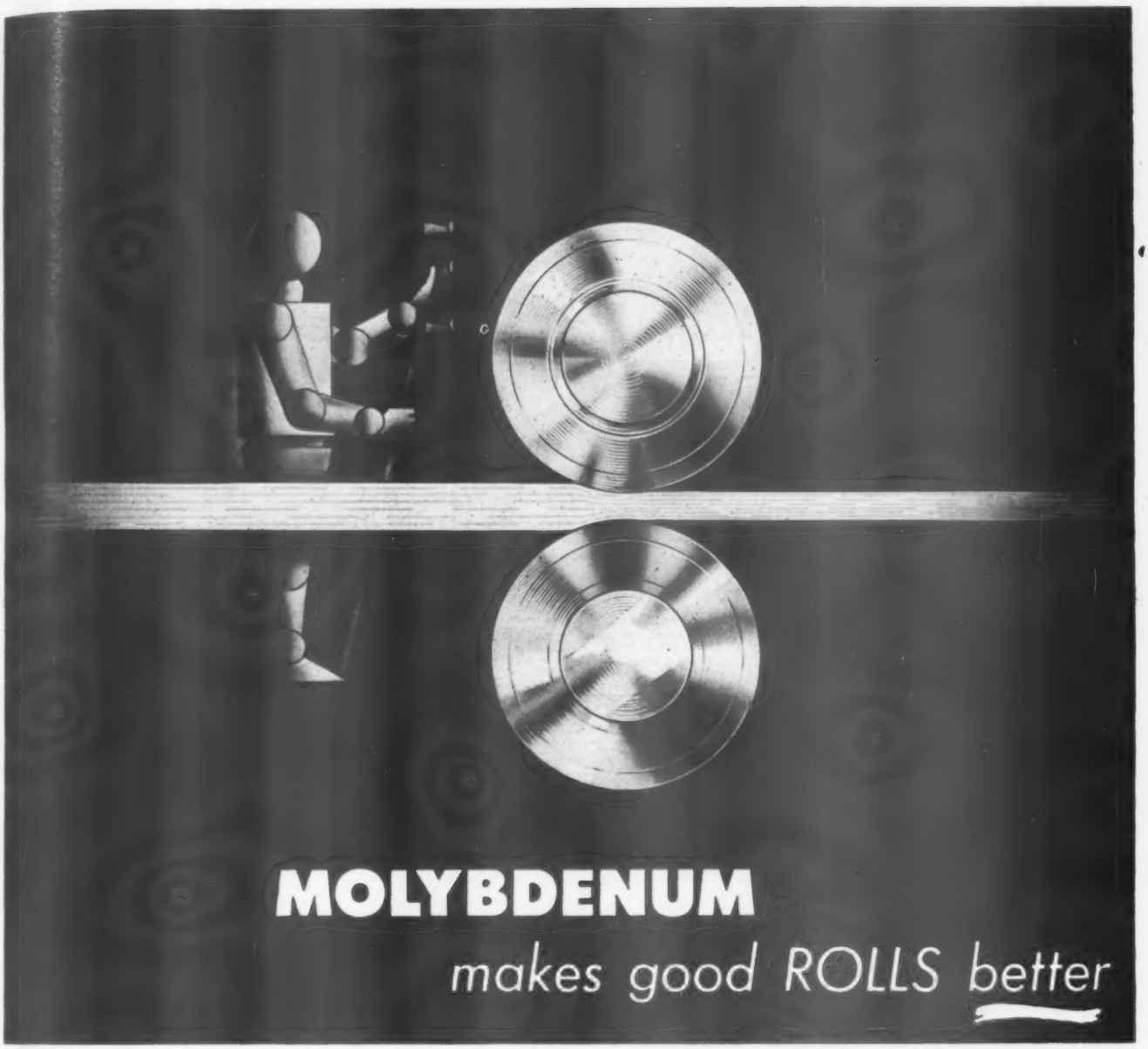


firmly in the handle for use on the grinder wheel steady rest. It is claimed that by rolling across the face of the wheel at a slightly inclined angle a good dress is obtained. To release the nib for use in the adaptor rod of a center grinder or any other machine taking a 7/16-inch shank nib, it is only necessary for the operator to hold the handle and press down on the ejector rod. The nib pops loose. When further use as a hand tool is required the nib may be pressed back by hand into the socket.

Walrus Leather: Greene, Tweed & Co., 4377 Bronx Boulevard, New York 66, has developed an improved process of tanning walrus hides used on wheels or bobs for polishing metal surfaces. The close firm grain of this specially tanned leather is said to result in a more lustrous and durable mirror finish than can be obtained by any other material. The leather is available in any thickness from ½ to 1½ inches for any size wheel or bob.

Gravity Feed Oiler: Oil-Rite Corp., 3487 South Thirteenth Street, Milwaukee 7, now is offering a new sight gravity feed oiler of rugged construc-

(*Continued on page* 140)



An addition of .20% to .50% of Molybdenum—so says a leading manufacturer of rolling mill equipment—accounts mainly for the difference between a good plain chilled roll and a roll that is much stronger, tougher, and better adapted for operating at high temperatures. Improved quality in the roll itself results in a better sustained output of superior quality, at lower unit cost. Electrical sheets, furniture stock, fender stock, and auto-body sheets are examples of products more successfully turned out by the molybdenum-alloyed roll.

Rolls are among many cast and wrought steel and iron products that have been greatly improved by alloying and by newly developed plant procedures in recent years. Very small additions, rightly introduced, yield surprising results.

Inquiries concerning any problem on which Molybdenum, Tungsten, or Boron may be useful, will be welcomed by the Molybdenum Corporation.

AMERICAN Production, American Distribution,
American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.
Works: Washington, Pa.; York, Pa.
Mines: Questa, N. M.; Yucca, Ariz.; Urad, Colo.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

THE BOND WITH A PEDIGREE..

FV

A thousand test formulas—hundreds of bonds of various kinds—fifty years experience making bonds for the world's best grinding wheels—this is the Pedigree behind the new FV Bond.

FV Bond holds wheel shapes firm even when run at high speed, and produces a satin-like finish that is so accurate it passes any surface analyzer test hands down.

FOR THAT PERFECT FINISH

Today's precision instruments and tools as well as mass production of war equipment parts, call for finishes with closer tolerances than ever before—finishes that can be measured in micro inches. Just any old wheel won't do. That's why this better bond—FV—was developed for all Chicago Wheels.

There's a best grain, grade, size and shape wheel—all made with FV Bond—for each kind of material to be finished—a whole army of Chicago Wheels at your service.

CHICAGO MOUNTED WHEELS

All the most needed shapes, each mounted firmly on its own steel shank to last as long as the wheel itself.

CHICAGO GRINDING WHEELS

For the duration, with full WPB approval, we are specializing on sizes up to 3″ in diameter only.

TRY ONE! It's the quick way to find out about FV Bond. We'll make it easy for you by sending, without charge, any size you specify to fit any grinder.

★ Half a Century of Specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

FREE ENGINEERING ANALYSIS

Some of the new metals, alloys and laminates present real grinding problems. If you have a job that stumps you, our experts will work with you to determine the best wheel to give the job *that perfect finish* in the quickest time.

Write for Catalog & Engineering Survey Form

CHICAGO WHEEL & MFG. CO.

1101 West Monroe St. Dept. F D Chicago, Illinois

Send Catalog and Survey Form. Interested in: FD-8
☐ Grinding Wheels. ☐ Mounted Wheels.
☐ Send Test Wheel. Size.....

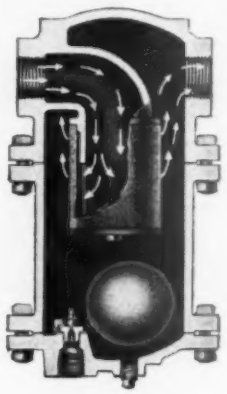
Name.....

Address.....

(*Continued from page* 138)

tion and pleasing appearance. Rate of oil flow can be regulated by an adjustable needle valve. A feature is the unbreakable sight in the shank which eliminates replacements and prevents hazards of broken glass. Oil supply always is visible through the heavy-wall unbreakable lucite reservoir which does not become dull and cloudy. The device easily may be taken apart for cleaning. For certain applications with temperatures in excess of 150 degrees Fahr., glass reservoirs and sights can be furnished. Capacities range from ⅝-ounce to 30 ounces.

Air Separator: Johnson Corp., Three Rivers, Mich., has developed a self-draining compressed air separator which eliminates the need for external traps or manual draining. The trap mechanism is built right in and, it is



claimed, automatically releases from the separator all the water, oil and other moisture. Operation is based on two principles—expansion, and change of direction. Entering air first expands slightly, thereby precipitating most of the moisture. Then it passes through a labyrinth of coarse wire mesh, changing direction of flow many times to surrender the remaining particles of foreign material. When the level of the accumulated liquid in the bottom of the separator is sufficient to raise the float, the valve opens and the liquid flows into the drain. The unit is available in capacities of 80 or 160 cubic feet of free air per minute at 90 pounds pressure.

Floor Covering: Truscon Laboratories, Caniff and Grand Trunk R. R. Detroit 11, has announced development of a heavy, non-slip plastic covering for floors, decks, stairways, etc., which not only makes footing secure, but also takes a great deal of surface wear. The material, known as Saf-T-Dek, comes ready for use and is applied with a trowel to a thickness of about 1/32-inch. It is a tough, tenacious material, sticks to practically any surface, wood, steel, concrete, or even glass. When dry it imparts a skid-proof walking or working area. Even when wet or

(*Continued on page* 144)

It's DINGS MAGNETS for LIFTING YOU CAN DEPEND ON

Built to give you more

P.L.H.

POUND LIFTING HOURS

FEATURES:

Coil Locked in Place — to prevent damage and short circuiting.

•

Coil Waterproofed — impregnated under pressure.

•

Large Structural Fins — impart added strength and radiate heat.

•

Leads Fully Protected.

•

Heavy Bottom Plate Stands Rough Handling.

•

Special Steels and Highest Quality Construction.

THE power, ruggedness and balanced design of every DING'S High Intensity Magnet is the result of over forty years of building magnetic equipment exclusively. The entire Dings organization is devoted to building better magnets and the engineering department is concerned only with magnetic design and operation. These years of research, testing and design have produced the DINGS High Intensity Lifting Magnet, a machine in which the balance of copper wire and steel is correctly proportioned to obtain maximum *lifting* capacity with a minimum of weight and current input.

A complete line of High Intensity Circular and Rectangular lifting magnets, to meet every requirement, is offered to those with metal handling problems.

For complete information and CATALOG, write today.

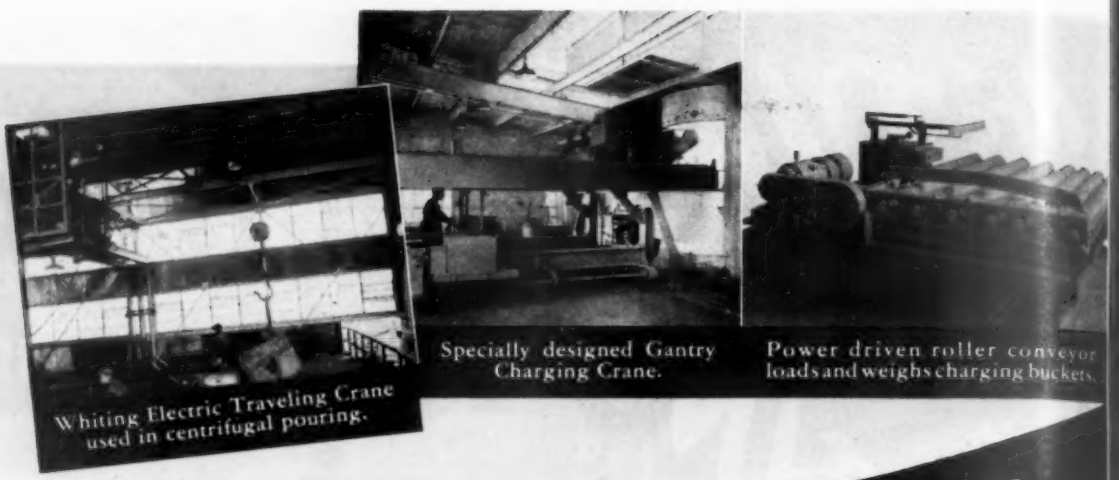
DINGS MAGNETIC SEPARATOR CO.

512 East Smith Street, Milwaukee 7, Wisconsin

Dings MAGNETIC SEPARATION HIGH INTENSITY

MAGNETIC HEADQUARTERS SINCE 1899

WORLD'S LARGEST EXCLUSIVE BUILDERS OF MAGNETIC EQUIPMENT

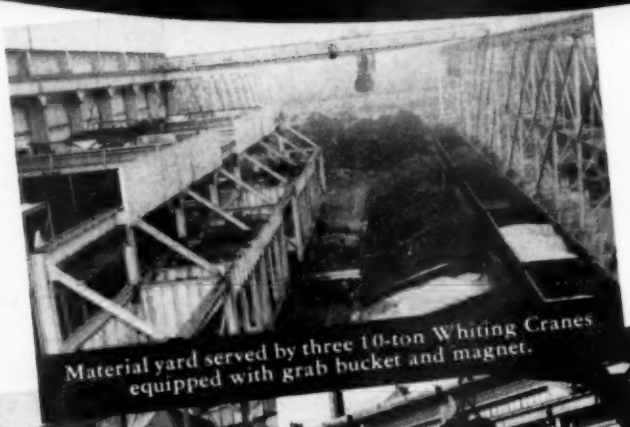


Whiting Electric Traveling Crane used in centrifugal pouring.

Specially designed Gantry Charging Crane.

Power driven roller conveyor loads and weighs charging buckets.

From MATERIALS YARD

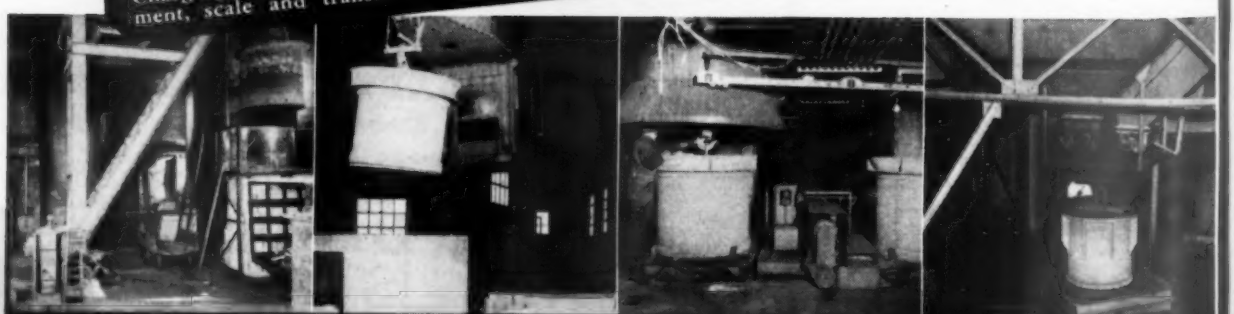


Material yard served by three 10-ton Whiting Cranes equipped with grab bucket and magnet.

Charging bucket loading equipment, scale and transfer car.

Magnet crane fills Sivyer charging buckets.

Annealing oven transfer car for handling trucks or cars.



Whiting Jib Crane used with wishbone.

Whiting monorail charging system.

Motor-driven transfer car used in making up charges.

Transfer cars on circular track — gravity fed.

to FINISHED CASTINGS

Whiting Equipment *saves time...labor...manpower*

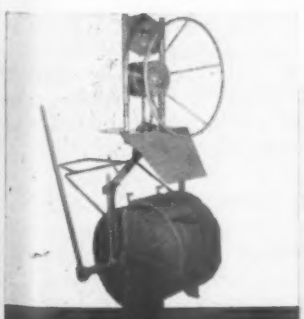
Practical foundrymen, who have worked in foundries for years, are the originators of Whiting Equipment to conserve manpower and increase output. They not only design standard units, but also special equipment to meet individual needs.

To indicate the breadth of their experience and capabilities, these pages show a few of their units for expediting the handling of materials. Whatever your problems in foundry operation, give Whiting engineers an opportunity to help you. Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

Pouring ingot molds with special Whiting motor-driven ladle car.

Special single-leg gantry for charging annealing furnace.

Crane used for handling molds.



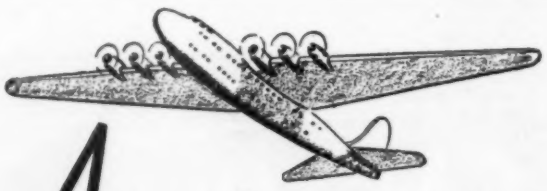
Ladle handler and cylindrical teapot spout ladle.

ARMY NAVY

WHITING CORPORATION

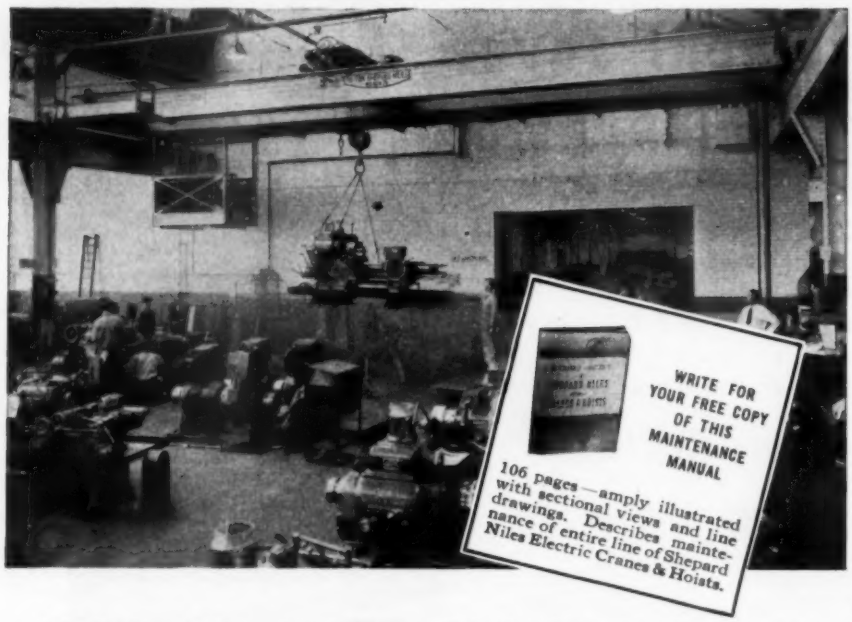
SIXTY YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D.C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario.



Air transport

minus the wings


WRITE FOR YOUR FREE COPY OF THIS MAINTENANCE MANUAL
106 pages—amply illustrated with sectional views and line drawings. Describes maintenance of entire line of Shepard Niles Electric Cranes & Hoists.

Like the famed air transport planes of the armed services, Shepard Niles Overhead Electric Traveling Cranes depend upon faultless engineering and rugged construction for their ability to "pick-up-and-go" with heavy loads.

While tremendous stresses are put upon the crane girders, the heart of the entire installation is the crane trolley, or hoisting unit. Here is where the going is *really* tough. And *here* is where the time-proven, Shepard Niles - developed features, such as the "Balanced Drive" (where stresses are evenly distributed through the hoisting unit by means of the planetary gearing principle) and the "bath of oil" system (in which the entire gear train operates in a bath of oil) remove the danger of excessive wear.

Ask one of the Shepard Niles representatives in your locality to show you how these and other equally sound principles can be applied profitably to your problem.

* * *

Overhead Electric Traveling Cranes are made in either welded or riveted box girder construction. Capacities: Welded box girder, up to 15 tons; riveted box girder, up to 450 tons.

Shepard Niles

CRANE & HOIST CORPORATION

360 SCHUYLER AVE. • MONTOUR FALLS, N.Y.

(*Continued from page* 140)

covered with oil emulsion, it still is said to be non-slip. The material is available in two colors, tile red and concrete gray. It also may be had in a spark-proof type where non-sparking floors are considered necessary.

Marking Holder: M. E. Cunningham Co., 97 East Carson Street, Pittsburgh, has developed a new peripheral marking holder for stamping characters around the outer circumference of tubing. It features a hand grip lock, and is equipped with a pointed screw which holds the unit firmly in position for marking. The device eliminates separate handling for each character and permits peripheral marking around the end rather than along the length of tubes.

Bench Rammer: Master Tool Co. Inc., 6505 Herman Avenue, Cleveland 2, is offering a bench type rammer built to the same specifications as the

company's floor rammer. Its overall length is 20 inches, and weight including butt is 10¾ pounds. The cylinder is hard chrome plate, said to retain its original size three times longer than an unplated cylinder. A self-seating valve box requires only infrequent replacement. Sand is sealed out by a special design of the lower end.

Plastic Goggles: Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh 8, announces new all-plastic goggles featuring lightweight, wide vision and comfort. They are suitable for both men and women. Large aviation-type lenses afford a wide, unobstructed angle of vision. The frame is available in two styles, a general purpose model providing direct ventilation through holes at top and bottom of the eye cups, and a dust model having indirect ventilation through serrated lens seats. All lenses are of polished sheet acetate, clear or green in color, and are replaced quickly and inexpensively.

Foot Control: Nobur Mfg. Co., 910 North Orange Street, Los Angeles, is introducing a new foot control unit for use in actuating the movement of its burr-removing tools. It permits the operator to work more efficiently by allowing him to operate at the most convenient angle. With this unit any drill press is said to be readily converted

(*Concluded on page* 146)

WHAT IS YOUR *Cleaning* PROBLEM?

This Sly Blast Room (10′ x 16′) is equipped with Monorail and car track to facilitate handling large castings.

Note the excellent lighting. The walls and doors have an *extra layer* of steel. The ceiling is of *triple construction* to assure complete and uniform ventilation. These are standard features of Sly Blast Rooms. What is *your* cleaning problem? There is a SLY ENGINEER in your vicinity, available for consultation.

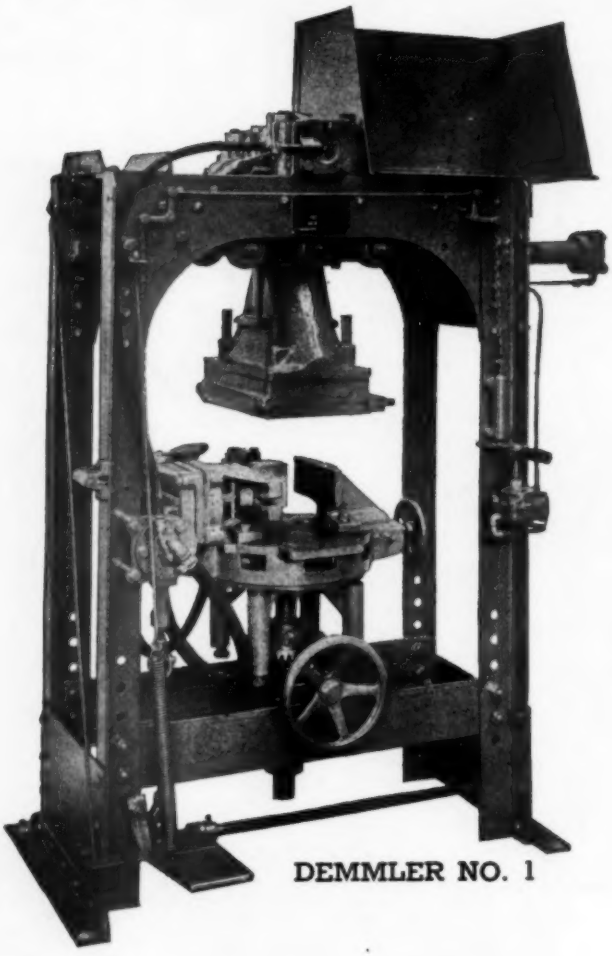
THE W. W. SLY MFG. CO.
4753 Train Avenue **Cleveland 2, Ohio**

SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS ★ BLAST CLEANING EQUIPMENT

★ ★ ★ SINCE 1911 ★ ★ ★

DEPENDABLE **CORE BLOWING** EQUIPMENT



DEMMLER NO. 1

This unit designed especially for small core work such as plumbing goods, electrical fittings, stove burners, valves and small pipe fittings. Ideally suited to quantity core production on all types of small brass, malleable, and gray iron work. Detailed specifications on this or other models on request . . . a type and size for every core blowing need.

WM. DEMMLER & BROS.
KEWANEE, ILLINOIS

CORE BLOWERS *Exclusively*

(*Concluded from page* 144)

into an efficient machine specifically adapted to burring.

Adjustable Hole Cutters: Robert H. Clark Co., 9330 Santa Monica Boulevard, Beverly Hills, Calif., offers a new set of three adjustable hole cutters for cutting all possible diameters from ⅝ to 3½ inches. These cutters—with straight shanks for use as hand tools, in portable electric and pneumatic drills, or in light drill presses—are said to produce accurate, clean holes that require no finishing. The cutters consist of a straight shank on a hexagon body, into which are set three high-speed steel blades at 120 degree intervals.

Ratchet Wrench: Keller Tool Co., Grand Haven, Mich., has developed a pneumatic ratchet wrench in which the side plates are milled with slots the entire length to provide accurate alignment and rigid support for the socket. Double strength in the pawl is secured

by two ratchets engaging the teeth and with two compression springs for balanced pressure at point of contact. The cam is lubricated from the same fitting used to grease the rotor and gears. The tool is available in three sizes with sockets for use on nut running jobs ranging from ¼ to ¾-inch. By turning the wrench over it can be used for removing nuts.

Industry Briefs

(*Concluded from page* 114)

1943. The first renewal of the award was made last November.

° ° °

Lynchburg Foundry Co. has completed installation of a new mechanized molding unit at its Lynchburg, Va., plant. The unit is divided into three independent molding sections, each section containing two duplicate molding machines; intermittent motion, power driven mold conveyor loop with independent pour-off and cooling zones; vibrating shakeout unit, and gravity roller return flask conveyor.

° ° °

Homestead Valve Mfg. Co., Coraopolis, Pa., has been awarded a third additional gold star by the United States Maritime Commission to be added to the company's "M" pennant.

° ° °

Brumund Bros. & Hufker Foundry Inc., Chicago, producer of brass and aluminum castings, has added a 25 x 30-foot furnace room to its plant.

Highest
GREEN STRENGTH

You need less clay and less tempering water. You get fewer fines.

Highest
PERMEABILITY

This brings about lower scrap, fewer blows and greater safety.

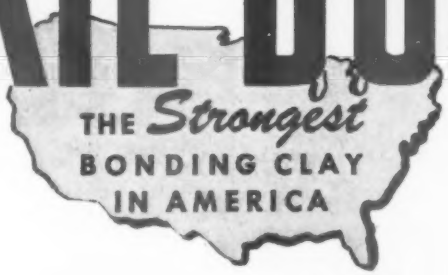
★ ★ ★

Highest
FLOWABILITY

No swells encountered Your castings have a better finish and run true to pattern.

★ ★ ★

DIXIE BOND



Moderate
DRY STRENGTH

Faster shake-out results. No lumpy sand, less flask abuse, no cracked castings.

Less
CONTRACTION

Less contraction at high temperatures. You have fewer fins, scabs and cope pull-downs.

★ ★ ★

High
SINTERING POINT

Another factor which gives a finer finish and cheaper cleaning. Quality up, costs down.

ECP's 30-year experience goes into making Dixie Bond the strongest bonding clay in America — and into advising exactly where it belongs in your picture. The qualities outlined here point to definite uses, ***and no others.*** We offer you five bonding clays in all, each one of them adapted to particular conditions, and many varying combinations. Thus equipped, ECP engineers are free to work out the **one** right answer to every problem. Why not try us?

We'll be glad to send you a bulletin on any ECP product.

EASTERN CLAY PRODUCTS, INC.
EIFORT, OHIO

ECP

DIXIE BOND · BLACK HILLS BENTONITE · REVIVO BOND · REVIVO SUPER BOND · BALANCED REVIVO

All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

A World of Alloys

AT YOUR COMMAND

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NIAGARA FALLS SMELTING AND REFINING CORP.
Buffalo, New York
AMERICA'S LARGEST PRODUCER OF ALLOYS

OBITUARY

JOSEPH W. HARRISON, 83, president and founder of the Harrison Steel Castings Co., Attica, Ind., died June 25 in Indianapolis. Mr. Harrison had an unusual record in the longevity of his association with the foundry industry, having started his apprenticeship at the age of 14 in England, where he was born. Coming to the United States in 1888 he worked for various foundries in Ohio before joining the Hinson & Herford Steel Castings Co., Converse, Ind., as superintendent. This company later was absorbed by the National Car Coupler Co., and Mr. Harrison subsequently assumed control of the latter and was named president. In 1906 the company built a new steel foundry at Attica, Ind., and in 1927 the firm name was changed to the Harrison Steel Castings Co., with Mr. Harrison continuing as president until his death.

JOSEPH W. HARRISON

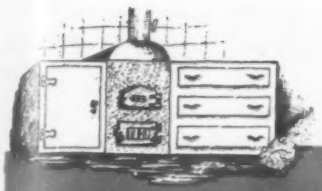
° ° °

Joseph F. Reed, 63, president and treasurer of the Kol-Master Corp., Oregon, Ill., died June 12 at his home near that city. Mr. Reed was born in Hollidaysburg, Pa., and after being graduated from Purdue University in 1907, he became superintendent of the Home Stove Works, Chicago. In 1912 he organized the Paragon Foundries Co., which in 1916 he moved to Oregon, Ill., and engaged principally in production of piano plates. Mr. Reed organized the Paragon-Kol-Master Corp. in 1912 to manufacture coal stokers. The company's name later was changed to Kol-Master Corp.

° ° °

Harry J. Deutsch, 49, works manager for the American Magnesium Corp., Bridgeport, Conn., died in that city July 5 after a 3-months' illness. Born in Rapid City, S. Dak., and graduated from the South Dakota School of Mines, Mr. Deutsch was metallurgist with the Trojan Mining Co., Trojan, S. Dak., until 1919 when he joined the United States Aluminum Co., later the Aluminum Co. of America, in a similar capacity. He

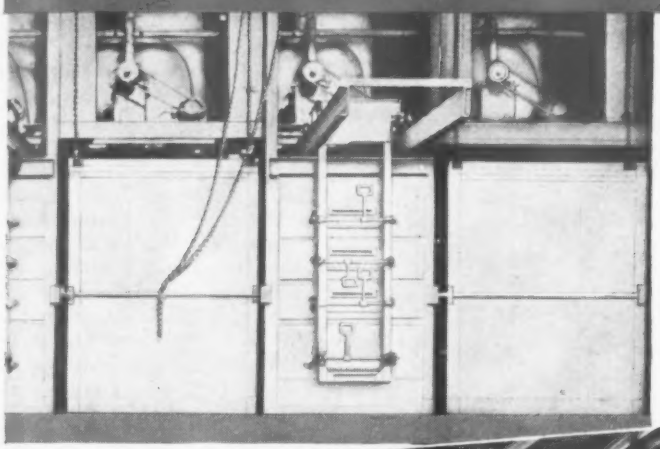
(*Continued on page* 150)



GONE FOR GOOD — the old fashioned core oven!

There's no better time to *invest* in modern

ROSS CORE OVENS



After V-Day, just as now, core quality and speed of production will be the chief factors in determining competitive standing. Whether Gray Iron, Magnesium or Aluminum, the future quality standard required of castings will demand better cores from which to make them. And core quality can be no better than the oven that bakes them.

ROSS Core Ovens, in a range of sizes and types for all requirements, are designed with the exclusive ROSS heating and circulating system that positively insures greater Uniformity, Elimination of Rejects, Increased Output in Less Time and in Less Space. The best proof of the remarkable performance of ROSS OVENS is the list of

Prominent Users:

Aluminum Company of America; American Locomotive Co.; Bohn Aluminum & Brass Co.; National Aluminum Cylinder Head Co.; Sperry Gyroscope Co. Inc.; Westinghouse Electric & Mfg. Co.; Wright Aeronautical Corporation—and many others.

The ROSS System of heating and circulation might be applied to improving your present oven. Why not ask us about this? No obligation.

ROSS SYSTEMS

J.O.ROSS ENGINEERING CORP.

350 MADISON AVE., New York 17, N. Y.

CHICAGO 6—201 North Wells Street **DETROIT 3—12953 Greeley Avenue**

ROSS ENGINEERING OF CANADA, LTD., Dominion Square Building, Montreal

CONTROL OF AIR FOR MODERN INDUSTRY

PEACE FOLLOWS WAR
WITH PRODUCTION
FOR CIVILIAN USE

HAUSFELD
METAL MELTING FURNACES

...will carry their share of this vital work in the days to come

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 148)

spent the next 21 years with the company in Detroit, subsequently becoming chief metallurgist. In 1940 Mr. Deutsch was transferred to Buffalo as manager of the American Magnesium Corp.'s foundry there, and 2 years later he was moved to Bridgeport.

• • •

George E. Baker, 63, retired foundryman and stove manufacturer, died June 13 in Belleville, Ill. He was a son of the late Joseph C. Baker, pioneer Belleville foundryman who founded the city's stove works which grew into one of its largest industries. This business, known in its infancy as the Snyder & Baker Foundry, and City Foundry, later became the Baker Stove Works, then the Baker-Nagle Co. George E. Baker entered the business after completing his schooling, and when his father retired was associated with his older brother, Albert J. Baker, in management of the plant. When the latter died he took over the sole management. Mr. Baker retired in 1928 when the company management was assumed by his brother-in-law, Walter Nagle.

• • •

Raphael Lavin, 85, founder and chairman, R. Lavin & Sons Inc., Chicago, died June 26 in that city. Coming to the United States from Lithuania in 1882, he founded the company for refining and smelting nonferrous metals 50 years ago, and was active in the business until he became ill 6 months ago. He is the father of William Lavin, president of the company, and Benjamin Lavin, secretary-treasurer.

• • •

Oliver W. Spencer, 52, vice president of the Southern Wheel Division, American Brake Shoe Co., New York, died June 18 in White Plains, N. Y. He was graduated from Yale University in 1917 and joined the American Brake Shoe Co. in 1921 as an apprentice, working his way up to the vice presidency, which he held for the past 5 years.

• • •

Winfield S. Snowberger, 80, who retired 12 years ago when superintendent of the former Cleveland plant of the Southern Wheel Co., died June 28 in Toledo, O. He joined the company in 1888 as a molder.

• • •

Charles Radley, 78, retired president of the Reliance Foundry Co., Cincinnati, died July 5 at his home in that city. Mr. Radley retired in 1937 because of ill health.

• • •

Clarence G. DeBord, 58, casting inspector at Harrison Steel Casting Co., Attica, Ind., died June 17.

• • •

Thomas Mellow, 85, founder of the Liberty Foundry Co., St. Louis, died June 24 in that city.

• • •

Robert H. Clifford, chief designing engineer, C. O. Bartlett & Snow Co., Cleveland, died July 11 in Cleveland

(*Concluded on page* 154)

LET'S RING IT AGAIN!

Every Sterling Grinding Wheel we make is dedicated to limitless progress in a free, unshackled America.

They are coming back wanting jobs—thirteen millions of them! Some sixty millions others will have to be transferred from wartime labor to peacetime employment. Never has there been so serious a necessity for economic adjustment. Never before has there been such need for serious, careful thinking, for not "rocking the boat"!

Wartime industry has met every demand for increased production, terrific taxation, costly plant conversion, and unparalleled acquiescence to wartime regulations. In spite of all this, industry still has done a magnificient job of supplying the tools for winning the war.

Industry is proud of its war record. If, in spite of restrictions, such a fine job has been done, think of the possibilities for peacetime prosperity if some of industry's most troublesome handicaps are eliminated!

Industry's problems are those of everyone who works—you and you and you! Industry—and it includes everyone in administration, plant and office—can make progress in an America where "government of the people, by the people and for the people" is permitted to remain a modern, living truth.

All of us in industry, given a fair chance and freed of wartime restrictions, can enjoy high wages, can create markets, invent, produce, sell! We can advance America to undreamed-of prosperity!

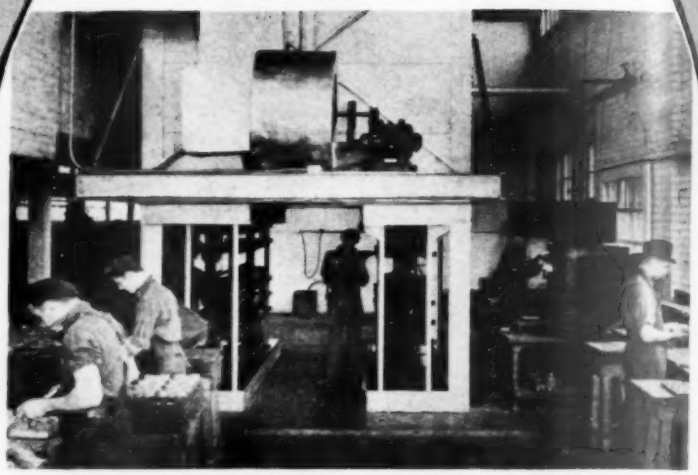
The Liberty Bell—let's ring it again!

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

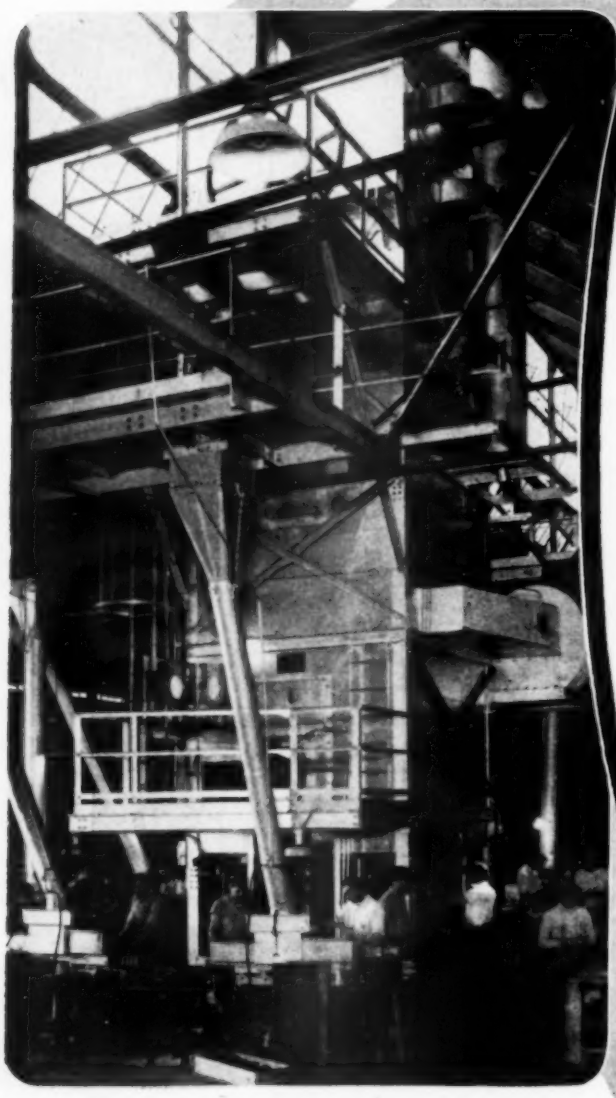
THE WHEELS OF INDUSTRY

Patented CENTER PASSAGEWA



Patented Center Passageway permits loading from inside and outside of Tower.

Grouping of Coremakers around 3 sides of Tower made possible by Patented Center Passageway.



Another example of close grouping of coremakers around a Coleman Tower Oven.

COLEMAN
CORE AND MOLD
OVENS

THE FOUNDR
BUILDERS OF COLEM
CLEVELAN

an outstanding feature of COLEMAN TOWER OVENS

This outstanding feature permits loading from inside as well as outside the Tower and increases loading accessibility by as much as 300% compared with other designs of Vertical Conveyor Ovens. This feature and the following advantages are responsible for the nation-wide acceptance of Coleman Tower Ovens in various classes of foundry work.

BETTER AND FASTER BAKING—Amazing baking speed is another of the many outstanding features of Coleman Tower Ovens. Perfectly baked cores eliminate rejects and make-overs.

RECUPERATIVE COOLING—The baked cores are cooled before they reach the unloading position and the recovered heat is used over again. This feature results in greatest fuel saving.

ANY FUEL—Coleman Tower Ovens may be operated with any "automatic" fuel such as gas, oil, electricity or stoker coal—whichever is most economical for your use. The same perfect baking guaranteed for all fuels!

LARGE LABOR SAVING—The efficient grouping of the coremakers and unloading arrangement made possible by the Patented Center Passageway greatly increases production efficiency and reduces indirect labor to a mere fraction.

BETTER WORKING CONDITIONS—Coleman recuperative cooling systems thoroughly "smoke-off" and cool the baked cores before unloading. No uncomfortable heat, acrid fumes or gases in core departments equipped with Coleman Tower Ovens.

EXPERIENCE—Coleman Oven Engineers have pioneered the development of vertical conveyor type core ovens. The extensive experience gained in building important installations for leading foundries in every class of foundry work is incorporated in every Coleman Tower Oven installation.

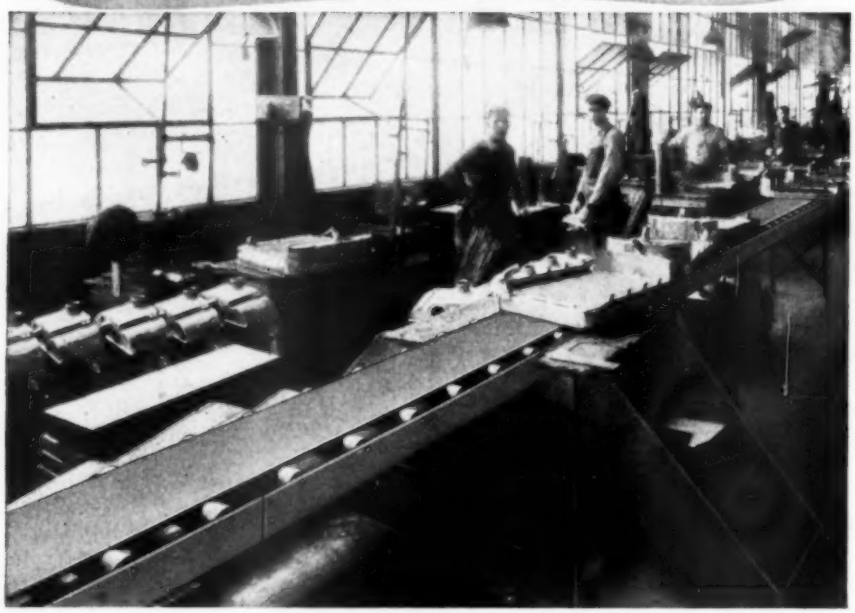
● *Other Types of Coleman Core and Mold Ovens*

COLEMAN Portable Ovens
COLEMAN Rolling Drawer Ovens
COLEMAN Transrack Ovens
COLEMAN Car Type Ovens
COLEMAN Horiz. Conveyor Ovens
COLEMAN Portable Mold Driers

Write for Folio of Bulletins

QUIPMENT CO.
D SWARTWOUT OVENS
, OHIO, U.S.A.

COLEMAN CORE AND MOLD OVENS



BELT CONVEYORS may be the Answer . . . Ask STANDARD CONVEYOR!

MANUAL handling is costly in time, manpower and space — the less of it you have the lower your costs in manufacturing, processing or storage handling.

Investigate conveyors — belt conveyors for example. Belt conveyors are amazingly versatile. They handle small packages as easily as bulky crates — articles need not have a smooth bottom or surface as they do not "roll" but ride the belt. The belt itself may be stitched canvas, rubber, white woven, wire mesh or steel.

Speed of travel can be controlled to a few feet or a hundred per minute. Conveyors can be inclined, declined, horizontal or a combination of all three and equipped with transfer and elevating arrangements. A single unit of belt conveyor can be made longer than any other type of power conveyor. The range of application is practically limitless.

We suggest you look into all the things belt conveyors can do — the many ways they can earn money for you.

Standard Conveyor makes power and gravity conveyors in belt, roller, chain, and slat types; spiral chutes, inclined elevators, tiering machines, portable pilers, pneumatic tube systems. Write for Standard's valuable reference book F-84 on conveyors and conveying methods.

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

(*Concluded from page* 150)

Heights, O. He had been associated with the firm for approximately 15 years.

• • •

W. L. Belknap Sr., 79, chairman of the board and formerly president for 46 years of the Belknap Mfg. Co., Bridgeport, Conn., died June 7 in that city.

• • •

Daniel C. Green, chairman of the board and chief executive officer of the Cleveland Pneumatic Tool Co., Cleveland, died July 2 at Petoskey, Mich.

• • •

William F. McCarthy, 68, president and founder, McCarthy Foundry Co., Chicago, died June 19 in that city.

Gray Iron–Steel Plus Graphite

(*Concluded from page* 88)

structure. Thousands of tests on cast-iron pipe and fittings have proved this beyond a doubt. Every leak is a flaw, sometimes a shrink, a blowhole, a cold run, or a sand or slag inclusion—but more often two or more of them together. One test 6-inch line was kept under gasoline pressure 233 days with all valves closed. The pressure, which was started at 800 pounds per square inch, rose and fell in exact proportion to the temperature for the whole time. The temperature in the line varied from 42 to 85 degrees with a corresponding change in pressure from 0 to 1690 pounds per square inch. Even a slight seepage through the whole surface of the line (100 feet of 6-inch pipe of different classes with wall thicknesses varying from 0.30 to 0.45 inch) would have been evident from the temperature-pressure relation. The line was under water and no sign of gasoline was ever visible during the test.

This expansion on freezing, while it tends to reduce shrinkage, cannot entirely eliminate it, since the expansion of the first shell tends to enlarge the mold. The next layer to freeze also expands, producing a further expansion in the still plastic outer shell, so that the still liquid metal of the interior is not sufficient to fill the volume due to this extra expansion; and as there is still some liquid shrinkage to take place, a pipe must result unless the cavity is fed.

Again referring to Fig. 5, we see that contraction on freezing gives the same set of phenomena at 1130 degrees that occur in steel at 725 degrees. Thus cast iron is twice put in jeopardy for the same offense. At 1130 degrees, though, cast iron has no tensile strength at all, while steel and cast iron have some strength at 725 degrees. Thus, for thick and thin sections joined together the only "out" is the plasticity of the metal and some compressive strength.

(*To be continued*)

Erie Foundry Co., Erie, Pa., has let contract to Sessinghaus & Ostergard Inc., that city, for a two-story office and plant addition.

You Get

- **UNIFORM OILS**
- **UNIFORM PERFORMANCE**
- **UNIFORM CASTINGS**

Every Time with

VELSICOL RESIN CORE OILS

There's a reason why you get these benefits with the use of VELSICOL CORE OILS. Their Resin Content introduces a feature of outstanding importance in core production. This feature, the active oxidizing property of the resin, permits accelerated baking time of cores, affords rapid collapsibility while metals are changing from the molten state, and yields throughly dry cores with diminished gas evolution. Lower gas content means fewer blow-holes and a minimum of rejects. The result is the efficient and economical casting of all types of metal.

This oxygen imparting resin, which is a vital component of the VELSICOL CORE OILS, is a product of the VELSICOL laboratory and refinery. Only uniformly good core oils, the ingredients of which are subject to the manufacturer's control, can assure cores of good construction with satisfactory functional qualities.

Whether you analyze it in a laboratory test-tube or use it in tank car quantities, you will find that VELSICOL CORE OIL does not deviate in uniformity. It is formulated to meet rigid specifications, and by virtue of adhering strictly to them, maintains the highest standards of performance.

Write for samples and other information direct to VELSICOL CORPORATION, 120 East Pearson Street, Chicago 11, Illinois, or to the representatives in your territory listed at left.

AUTHORIZED DEALERS

THE FOUNDRIES MATERIALS COMPANY
Coldwater and Detroit, Michigan

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MIDWEST FOUNDRY SUPPLY COMPANY
Edwardsville, Illinois

•

H. S. STOLLER & COMPANY
Akron, Ohio

•

THIEM PRODUCTS COMPANY
Milwaukee, Wisconsin

VELSICOL
Corporation

GENERAL OFFICES: 120 EAST PEARSON STREET, CHICAGO

VELSICOL

PLANT: MARSHALL, ILLINOIS

OLD TIMERS or GREEN HANDS

get good results with CORTLAND WHEELS

Whether your men are "old timers" or "green hands," a Cortland Wheel may improve their output. Because Cortland specializes in wheels for snagging—portable, floor stand and swing frame: Vitrified bonded for operating speeds up to 6,500 S.F.M., and Resinoid bonded for operating speeds up to 9,500 S.F.M.

"Tell us about your operations." We'll recommend the best wheels for cutting costs.

Write CORTLAND GRINDING WHEELS CORP., 6 Cortland Street, Chester, Massachusetts.

For Better Snagging

8

CORTLAND

Manpower Problems

(*Continued from page* 112)

cupational deferments by selective service should be granted liberally to employes engaged in foundry work. Wherever possible, men with foundry experience now in the armed forces and assignment to duties within the limits of continental United States should be returned to civilian life to work in a foundry.

If the problem is to be solved Mr. Cannon believes the OPA must revise its pricing policies upward in line with practical suggestions made by the Industry Advisory Committee. The WLB should clear the many foundry cases now waiting for action. Mr. Cannon indicated the WPB should establish production schedules based on true foundry capacity, give aid to pattern shops and other equipment manufacturers supplying the industry and adopt a more liberal amortization policy for the installation of facilities designed to improve production.

In order to increase the production of automotive type castings, particularly cylinder blocks and heads which are considered desperately critical, Mr. Cannon stated that government agencies should take steps to aid large automobile manufacturers to open and increase production of their foundries. He stated that labor organizations should give greater cooperation in raising production standards and reducing absenteeism. In closing he indicated that foundries in the different areas should exchange views and present their problems and recommendations to the Industry Advisory Committee of the WPB and to the Gray Iron Founders' Society.

Need Co-ordinated Action

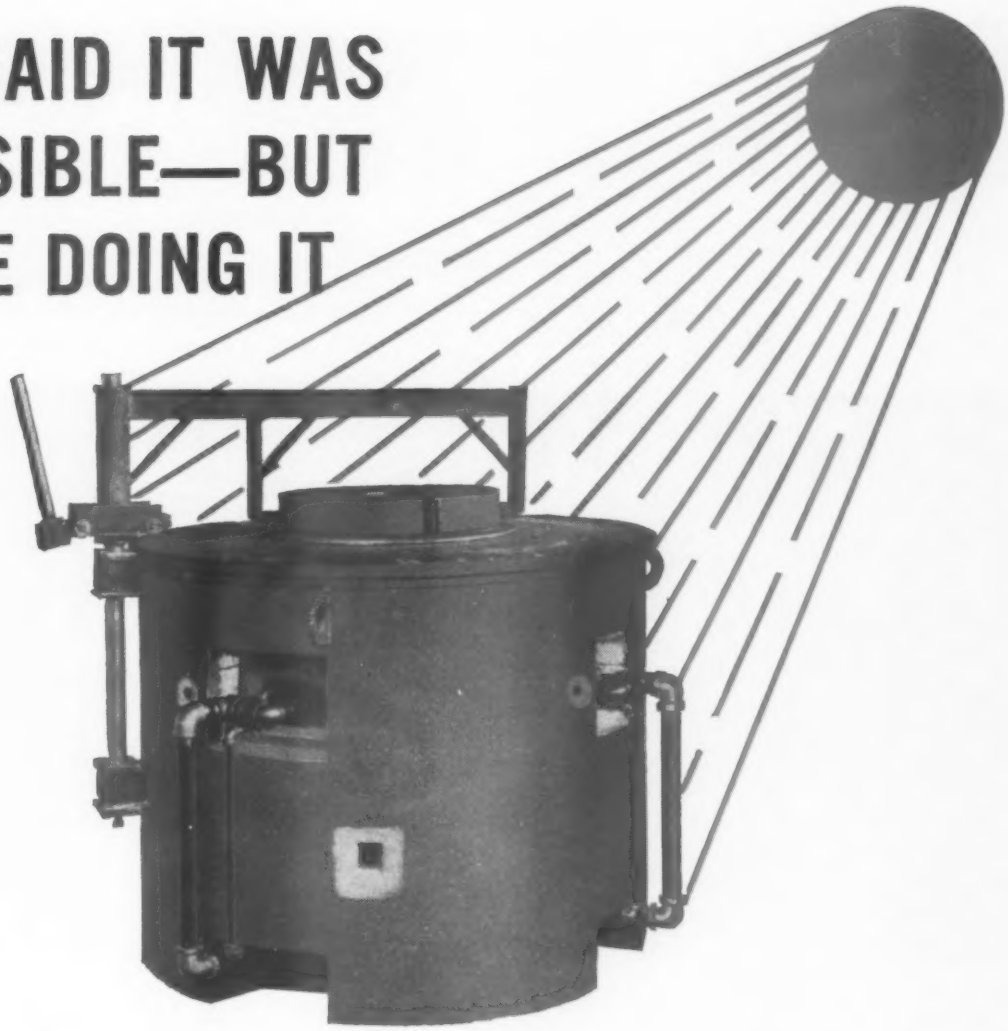
William M. Caldwell, newly-appointed assistant to the executive vice president, Gray Iron Founders' Society, Washington, declared the difficulty in arriving at a definite solution to the present critical situation of castings production is caused by the lack of power on the part of government to co-ordinate various functions of the separate agencies which can help.

Because of declining profits, many foundries have exhausted surpluses to pay current bills. The Gray Iron Founders' Society has completed a survey of 96 critical foundries which indicates that the average wage increase has been 22 per cent. This would result in an increase of approximately 10 per cent in total costs, which should be considered in relation to an average profit margin of 4 per cent.

Further increases in labor rates can come only from advances in prices granted on application to the OPA, but this procedure is slow and costly and records generally show relief from that source to be inadequate and in many cases insufficient to cover wage increases. As a consequence, profits continue to decline and surpluses have become a thing of the past. Mr. Caldwell indi-

(*Continued on page* 160)

THEY SAID IT WAS IMPOSSIBLE—BUT WE ARE DOING IT



CRUCIBLE MELTING FURNACE

Radiant Furnaces, gas fired with patented Sun-X burners, are now establishing unheard of records.

Crucible Melting Furnaces **show faster heating and 50% to 100% longer pot life.**

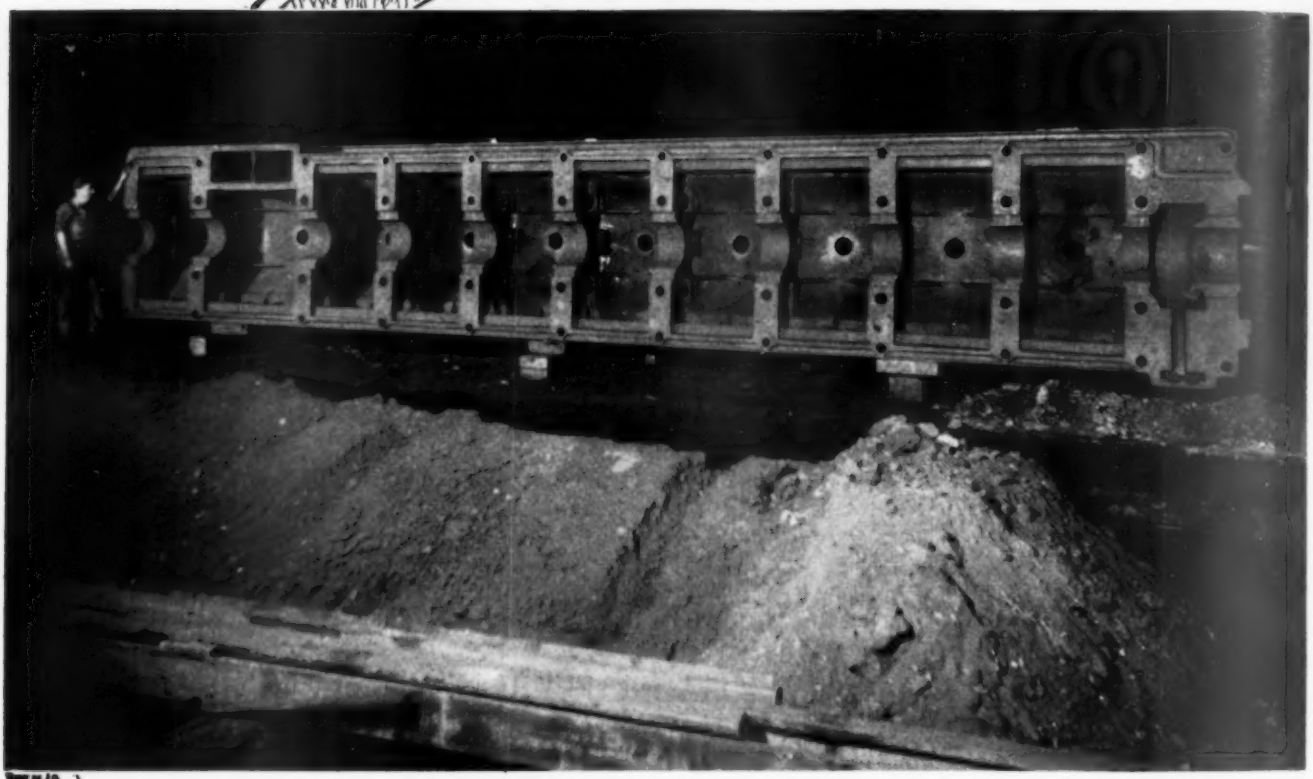
Actual production records show that Radiant's Sun-X burners are past the experimental stages. At last, therefore, Sun-X burners give you what you have always wanted . . . radiant heat from gas firing for crucible melting. These furnaces are available NOW.

Radiant Combustion, Inc

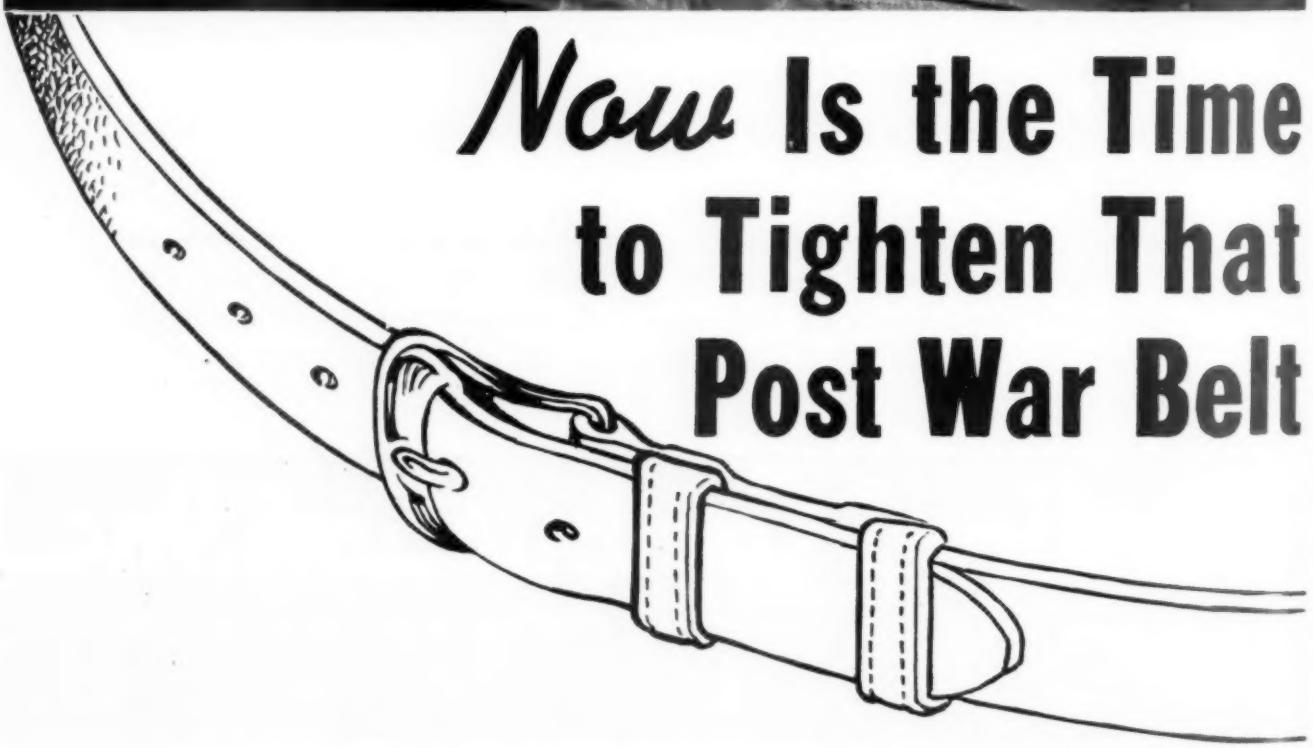
BUILDERS OF EVERY TYPE (OIL, GAS, ELECTRIC) OF HEAT TREATING FURNACE

WARREN, OHIO

Large Diesel Engine Base Casting immediately after being cleaned by Hydro-Blast. Casting size 28 ft. x 7 ft. x 4 ft. 6 in. Weight approximately 44,000 pounds.



Now Is the Time to Tighten That Post War Belt



A miscellany of small non-ferrous castings before and after cleaning by the Hydro-Blast Method. Hydro-Blast cleans all kinds and sizes of castings to microscopic cleanliness.

Hydro-Blast has long since established its ability to clean castings faster and better—from the smallest to the largest—aluminum, magnesium and brass—steel and gray iron. In more than 60 foundries in the United States, Canada and England, this modern method is cleaning war essential castings—knocking out the most complex cores and recovering waste sand in better than new condition. In fact, we are privileged to refer you to many foundries which have paid for their Hydro-Blast installations from sand economies during their first year of Hydro-Blast operation. For every mile gained by our forces in Europe and for every island taken in the Pacific, we draw closer to post war production with its necessary operational economies for successful consumer goods production.

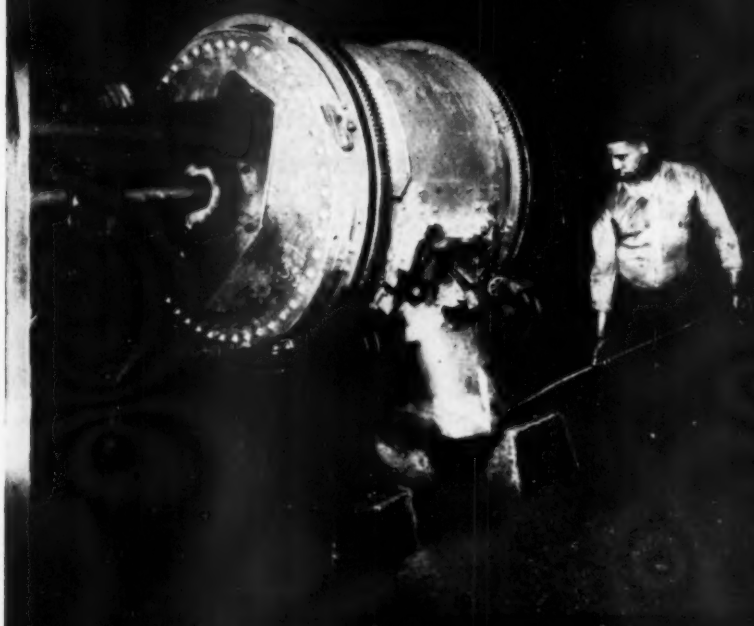
Is this not the moment when every foundry operator should secure complete facts and data on an equipment such as Hydro-Blast which offers so many outstanding advantages?

The HYDRO-BLAST CORPORATION
2550 N. Western Avenue • Chicago (47), Illinois

"Our metal losses run between .4% and .5% with a Detroit Rocking Electric Furnace"

A Foundry producing intricate bronze parts with a Detroit Rocking Electric Furnace Wrote recently, "Our principal alloy is 78-79% copper 2½% tin, 10% lead, 8-9% zinc, 0.5% nickel. Tests consistently showed the metal losses during melting run between .4% and .5%."

Records in scores of foundries show similar low metal losses and many other advantages. Detroit Electric Furnaces require less labor and produce more pounds of perfect castings per man-hour. They produce as many as 8 ferrous or 16 non-ferrous heats in one eight-hour day. Because they allow precise metallurgical control of any formula, Detroit Furnaces assure superior metallurgical results. Built in capacities from 10 to 8,000 lbs. Write today for further facts.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 156)

cated that the same difficulty arises in financing improvements by borrowing. Any banker on making loans must have the proof of ability to meet the obligation. He must know if the expenditure for the labor-saving equipment can be recovered within a reasonable time and if the equipment can be used effectively after the war. Present records of profit return indicate that borrowing will be difficult.

Mr. Caldwell declared that if the gray iron foundry industry is going to increase production it must have relief from ceiling prices. The need is for sound prices based upon sound costing. The speaker stated that the industry is at fault for a great deal of the present difficulty. In his opinion less than 25 per cent of the industry can determine the actual cost of a casting. This does not apply alone to small plants but is true of many large foundries as well. Mr. Caldwell stated that prices which do not reflect total costs plus a reasonable profit can lead only to ruin. The foundry which sells below a fair profit level not only threatens its own security but that of the entire industry. Accurate costs will be required if relief is to be obtained through the OPA.

Terminate War Contracts

Another reason for good costs, according to Mr. Caldwell, results from the fact that within the coming year many war contracts may be terminated. Both prime and subcontractors will be called upon to substantiate claims for finished and semifinished work. These claims cannot be supported by poor cost procedure, especially in disputed cases where the courts must recognize certain accounting practice. Mr. Caldwell stated that the society is developing plans for a comprehensive accounting service which will be available to both members and nonmembers.

The United States faces the largest tasks in history, that of saving the country and the rest of the world from power-maddened despots abroad, and, equally as important, of protecting itself from foes within, according to Representative Charles A. Halleck of Indiana, who addressed the luncheon meeting. Congressman Halleck is chairman of the Republican Congressional Committee and a member of the House Small Business Committee. He maintained that either we are going to choose to continue on the high road of human progress through free government, a free society and a free enterprise which offers equality of opportunity to all and success to those who have the ability and energy to seize and improve their opportunity, or we are going to abandon the American way. Either we are going to depart from the high road of human progress, abandon our way of government of economy and society and choose an alien pattern of regimentation which levels opportunity, and living and working conditions, or we are going to determine anew to keep

(*Continued on page* 162)

PENOLYN CORE OIL MEANS

LESS "GAS" TROUBLE

Gas-forming tendencies are held to a minimum when Penolyn Core Oil is used . . . thus saving time and waste due to imperfect castings.

Penolyn Core Oil helps in other ways to speed today's huge volume of war production. It bakes fast, holds hard, cleans fast. There's less "lost motion," more core and mold production with Penolyn Core Oil! Penolyn engineers are at your service—call them whenever you need help.

Whether it's a highly intricate aviation engine casting or a huge valve and coupling—Penolyn Core Oil helps speed both to war!

PITTSBURGH, PA.

Penola
Reg. U.S. Pat. Off.

NEW YORK
CHICAGO
DETROIT
ST. LOUIS

POSITIVE AIR PRESSURE
assures faster, uniform melting

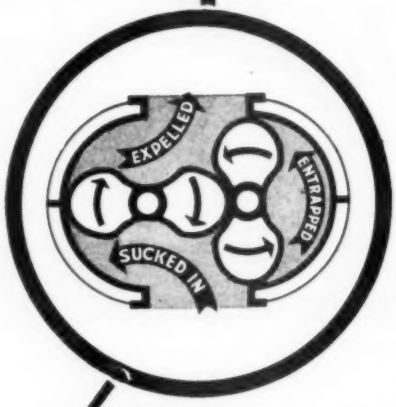
Roots-Connersville Positive Displacement Blowers automatically deliver air to the cupola at a *constant rate* REGARDLESS of varying pressure conditions in the cupola. It is thus possible with "R-C" Cupola Blowers to maintain the coke bed at the correct (hottest) height through the entire heat. The result is more uniform melting of the metal charge.

Furthermore, the consistent record of "R-C" Positive Displacement Blowers for low power consumption and extra-long life assures you the most *economical* air supply possible to obtain.

Write for Bulletin 22-B 12.

ROOTS - CONNERSVILLE BLOWER CORP.

408 Madison Ave. • Connersville, Ind.



POSITIVE DISPLACEMENT

The principle is simple and effective. Twin impellers are rotated in opposite directions by a pair of gears. Each impeller alternately sucks in, momentarily entraps, and then expels a definitely measured amount of air, resulting in the delivery of four equal pre-determined volumes each revolution of the drive shaft. Impellers need no seal or lubrication. Capacity varies with speed. Pressure is automatically built up to overcome resistance to air flow.

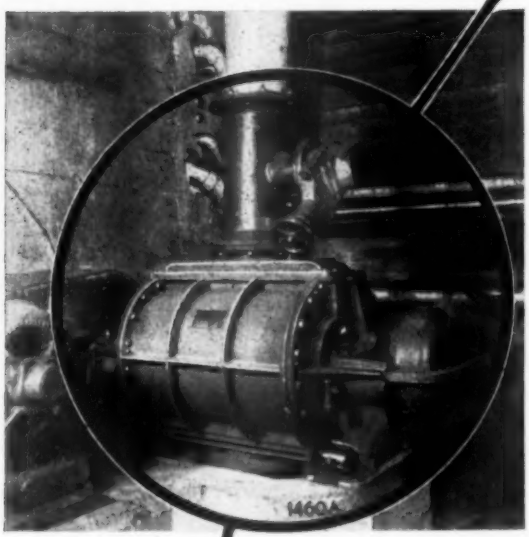


Photo shows "R-C" Blower supplying air blast to cupola, capacity 1950 c.f.m. at 375 r.p.m. V-Belt drive from motor.

BONDS BOUGHT TODAY

Help Win Beachheads Tomorrow

Roots CONNERSVILLE SINCE 1854

Positive Displacement
CUPOLA BLOWERS

(*Continued from page* 160)

our liberties, to keep a free economy filled with opportunities, to keep a free society based upon the Bill of Rights, to keep a government of checks and balances, to keep control over government and the governors.

Congressman Halleck emphasized the fact that the peace is not going to be won by theorists. America is not going to be adjusted by dreamers. Jobs are not going to be provided by theoretical or communistic soap box orators or by parlor pinks writing theses on matters about which they know little or nothing. The peace is going to be written by business men, by working people, and by farmers, who think, toil and sweat.

If business should fail, if industry and agriculture should be unable to provide jobs with good wages and salaries for the American people under an economy producing more goods and services for the people at decreasing prices, then we will have fought this war against totalitarianism in vain because government would continue to be the principal employer of labor, according to Congressman Halleck. He stated that it is not possible for a free government to survive in a controlled economy any more than it is possible for a free economy to survive in a totalitarian government. The speaker stressed the belief that under intelligent and reasonable government regulations, American industry can expand and prosper, providing jobs with futures and making profits, through our genius for mass production efficiency. However, it will wither and die under government domination and government competition.

Next Few Months Critical

From the viewpoint of manpower, the next 3 to 6 months may very well be the most critical we have experienced since the beginning of the war emergency, according to Dean William H. Spencer, University of Chicago, and Chicago regional director, WMC. Dean Spencer stated that from 15,000 to 20,000 men are needed now in foundries and forge shops. Experts indicate the least these industries must have to continue production schedules will be 10,000 male workers. Top priorities have been granted and the National Production Executive Committee has added critical gray iron foundries to the list of "must" programs. This designation means that these establishments will be entitled to the same preferential consideration received by other organizations on that list.

Dean Spencer outlined the growth in demand for gray iron castings which resulted in shortages of castings in the fall of 1942. He discussed the work that has been undertaken at Milwaukee based on co-operative arrangements between management of selected local foundries, local training agencies, and the United States Employment Service of the War Manpower Commission. He also outlined the situation with regard to short-

(*Continued on page* 164)

Marabond

For Cores... Facings... Backings

Marabond is an organic binder which creates reducing conditions in the mold at the elevated temperatures existing during pouring!

CORES MADE WITH *Marabond* SHOW THE FOLLOWING ADVANTAGES:

SMOOTHER CASTINGS—Decreased Cleaning Room time and labor.
EXCELLENT COLLAPSIBILITY—No Hot Tears and easy Shakeout.
NO ACRID OR NAUSEATING GAS—In Core Room or on the Foundry Floor.
FASTER BAKING—Both Time and Temperature may be reduced.
REDUCED COSTS—Total Cost of all ingredients materially reduced.

Marabond replaces all or major portion of oil in Facing Sands—gives faster baking at lower temperature—gives better flowability—and reduces penetration.

HOT RECLAIMED SAND CAN BE CONDITIONED WITH *Marabond*

Ordinarily such hot sands promptly lose their tempering water and become so stiff as to be unworkable when the molder attempts to use them. By adding ¾%-1% of *Marabond* to this mix and tempering to 6-7% moisture, such hot black sand will automatically level out and remain at a moisture content of 3%-3½% for an extended period. This results in a constantly workable backing sand without extensive retempering on the foundry floor.

WRITE FOR ADDITIONAL INFORMATION OR SAMPLE

Produced by the Makers of LIGNOLITE PATTERN PLATES

MARATHON CHEMICAL COMPANY

DIVISION OF MARATHON PAPER MILLS COMPANY

ROTHSCHILD **WISCONSIN**

Foundry OWNERS:

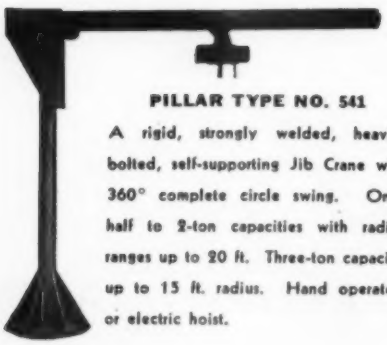
YOU OPERATE AT TOP EFFICIENCY WHEN OVERHEAD CRANES SERVE THE ENTIRE WORKING AREA LIKE THIS . . .

Photo Courtesy Weidenmiller Foundry Corp., Chicago, Ill.

FROM FURNACE TO POURING . . .

★ Above illustration shows an actual non-ferrous foundry installation of light-duty, Chicago Tramrail, hand-pushed Underhung Cranes covering the entire moulding floor area.

The hot metal is quickly delivered from furnaces at the right half of the building (which is also covered by cranes) then transferred to the moulding floor cranes which span the entire moulding area. This is but one of many hundreds of low-cost installations, designed and "built-in" by Chicago Tramrail engineers for speedier and safer foundry operation.



PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

***and at the* "SHAKE-OUT" *use* JIB CRANES. Here's Why:**

These nimble Jib Cranes swing fully 360° to receive loads from all overhead cranes that converge at the shake-out. And Jib Cranes are handling this operation with greater flexibility and speed, meanwhile releasing overhead cranes for other work. When ordering be sure to state lifting capacity, length of arm and distance from floor to arm. Illustrated circulars obtainable on request. Write

CHICAGO TRAMRAIL COMPANY

2810 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

(*Continued from page* 162)

ages of manpower in the Sixth region.

In conclusion, Dean Spencer emphasized the fact that every foundry official should have full understanding of the amended WMC employment stabilization programs which became effective on July 1. He stated that local offices of the WMC will welcome the interest of management and through this interest and understanding will obtain fullest co-operation and assistance.

Speaking on "Price Control of Gray Iron Castings" W. W. Welfling, chief, Gray Iron and Malleable Castings Section, OPA, Washington, outlined the basis upon which price control has been built. He indicated that the OPA operates within the framework of the Emergency Price Control Act of 1942 and the stabilization act, and discussed the understanding of the OPA with regard to generally fair and equitable prices.

Picture May Not Be True

In considering specific problems of the gray iron industry, he indicated that although profits have been declining in recent quarters from the favorable levels of 1941 and 1942, the industry is in the position of earning the same dollar volume of profit before taxes as it did in the prewar period. He cited statistics from sample gray iron foundries but indicated that relief granted to individual companies, or organizations in a fortunate position, may influence the true picture.

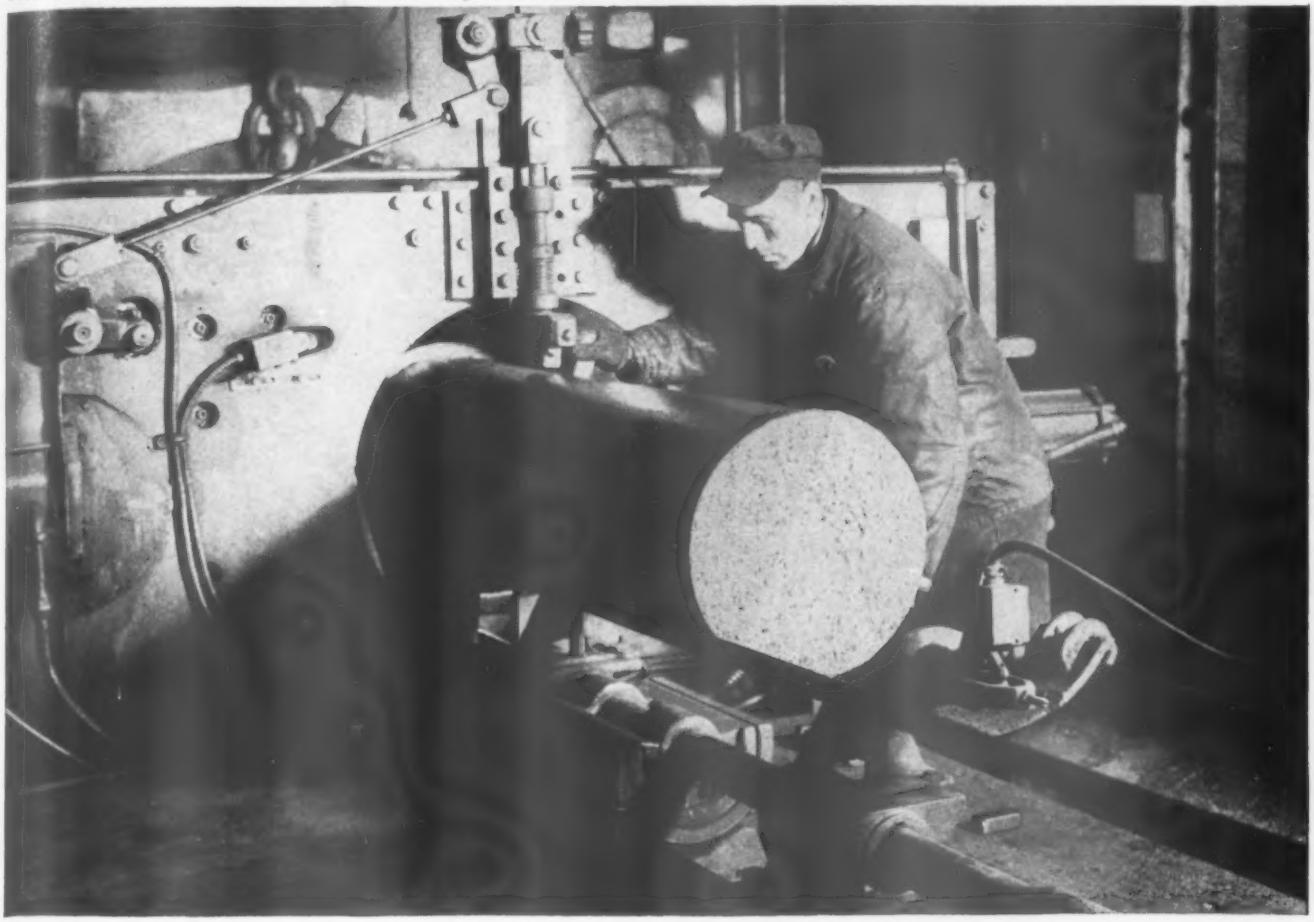
In considering the problem of general increase on all or a large part of a company's output of essential castings, Mr. Welfling stated that, broadly speaking, the OPA will grant sufficient overall adjustment to bring the earnings of the company up to its base-period profits, adjusted for increases in net worth, or to the base-period industry average. If overall earnings are in excess of base-period earnings because of operations other than gray iron, total costs in the gray iron foundry still will be covered. If the base-period was unprofitable, the OPA can allow a profit that removes the threat to production. The result of all efforts should be to remove any price impediment to the production of essential castings.

In summing up the industry's view of the price control situation, C. B. Magrath, president, Greenlee Foundry Co. and North Western Foundry Co., Chicago, and a member of the Gray Iron Castings Industry Advisory Committee of the OPA, indicated one difficulty with price control comes from the fact that the industry is divided into several groups, such as mechanized foundries, production shops, short-run shops or typical jobbing foundries, and specialty foundries. Some make consumer goods where others produce castings for industries.

Mr. Magrath deplored the willful lack of statistics on foundry costs. In his opinion the industry should not be exempt from price regulation but he does not

(*Concluded on page* 168)

Number 3 of a Series: *"Looking at the 5 essential things you never see in electrodes"*



...and the next will be a *Carbon Copy!*

. . . and the next one. And all that follow. Manufacturing experience—more of it than any other American electrode manufacturer has—taught us to "build in" uniformity at each of the many steps in the two to three months long process of making electrodes.

Because of this painstakingly achieved uniformity, "National" and "Acheson" electrodes give remarkably consistent performance for all types of electric furnace operation . . . a fact of utmost importance to the melter. And remember, too, that we have steadily reduced the average price of carbon and graphite electrodes . . . 40% for graphite in twenty years . . . at the same time that we greatly improved their operating qualities.

Essential *manufacturing experience* contributed to this orderly progress. But manufacturing experience is just one of the "five essential things *you never see* in electrodes." The others: Selection of raw materials, manufacturing control, continuing research, and customer service. These things . . . which you never see . . . we invite you to ask us about.

The words "National" and "Acheson" and the "National" Seal and the "Acheson" Seal are registered trade-marks of National Carbon Co., Inc.

NATIONAL ELECTRODES

ACHESON GRAPHITE

NATIONAL CARBON COMPANY INC.

Unit of Union Carbide and Carbon Corporation

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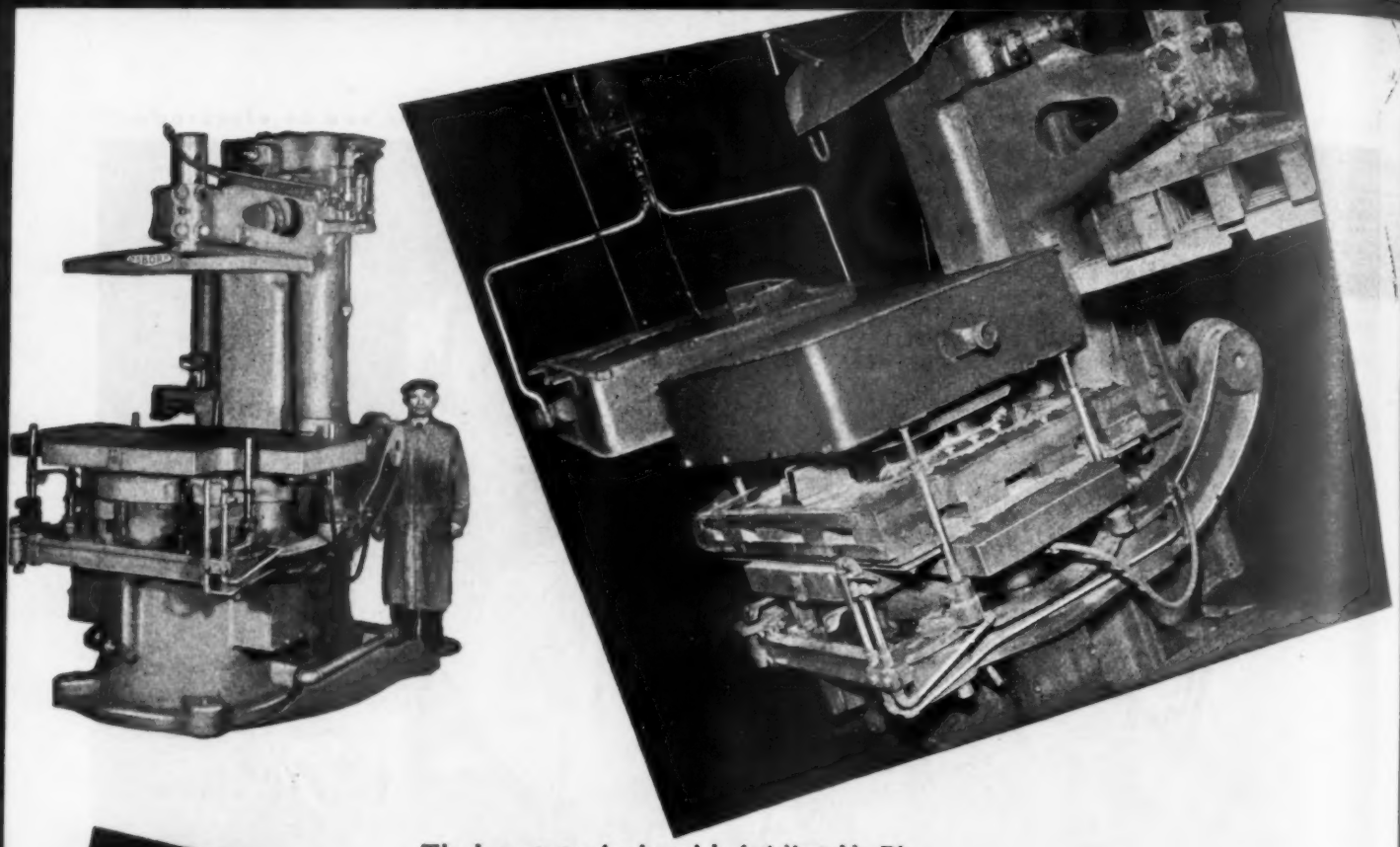
ELECTRODE SALES DIVISION, New York 17, N. Y.

Niagara Falls Cleveland Detroit San Francisco

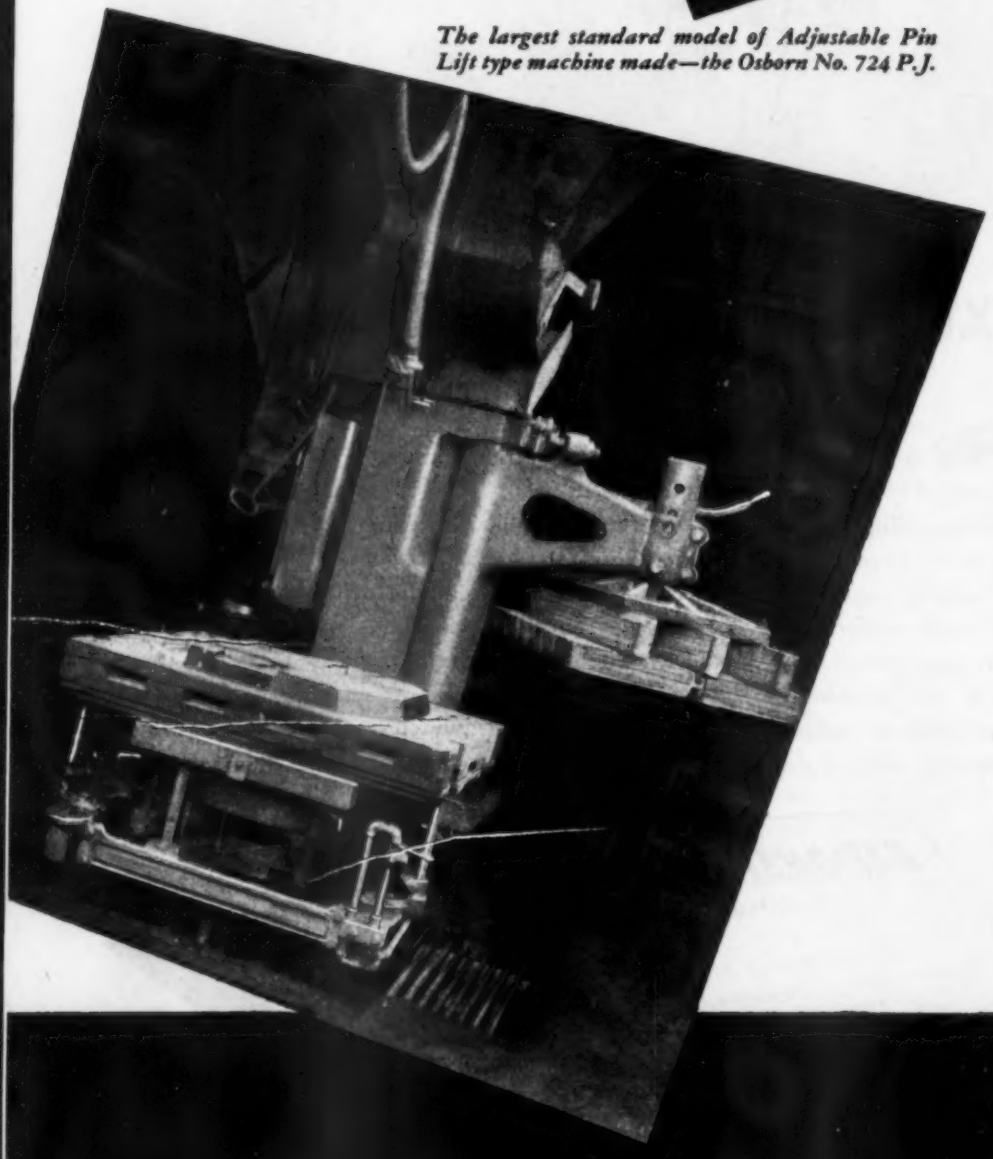
Pittsburgh Chicago Birmingham

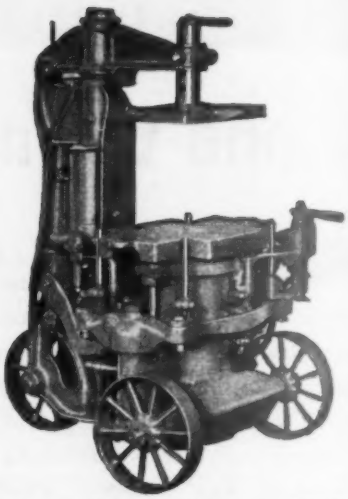
In Canada, Canadian National Carbon Company Limited, Welland, Ontario

BUY UNITED STATES WAR BONDS



The largest standard model of Adjustable Pin Lift type machine made—the Osborn No. 724 P.J.





The smallest standard model of Adjustable Pin Lift type machine made—the Osborn No. 710 J.

HAVE YOU SEEN OSBORN'S

NEW 24 INCH JOLT·SQUEEZE·STRIP

MOULDING MACHINE?

THE new Osborn 24" adjustable Pin Lift Jolt-Squeeze-Strip Moulding Machine is the *giant* of this type of foundry equipment.

It is especially designed to handle larger sizes of production and semi-production castings, for which no standard pin-lift type equipment was available prior to Osborn's introduction of this large size machine.

The giant Osborn No. 724 P.J. makes it possible to handle much of the larger work formerly handled on a Jolt Strip Machine . . . which is slower, requires an extra operation in ramming off the top of the mould with an air rammer.

The Osborn No. 724 P.J. is highly flexible—can be used on various types and sizes of work. It insures closest uniformity of output and is more economical to use because it produces more per man hour.

Adjustable Pin Lift Jolt-Squeeze-Strip Moulding Machines of All Sizes in the Osborn Line—from the Smallest 10" Size to the Largest 24" Size

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

OSBORN

MOULDING MACHINES

SCHRAMM COMPRESSORS ARE BALANCED

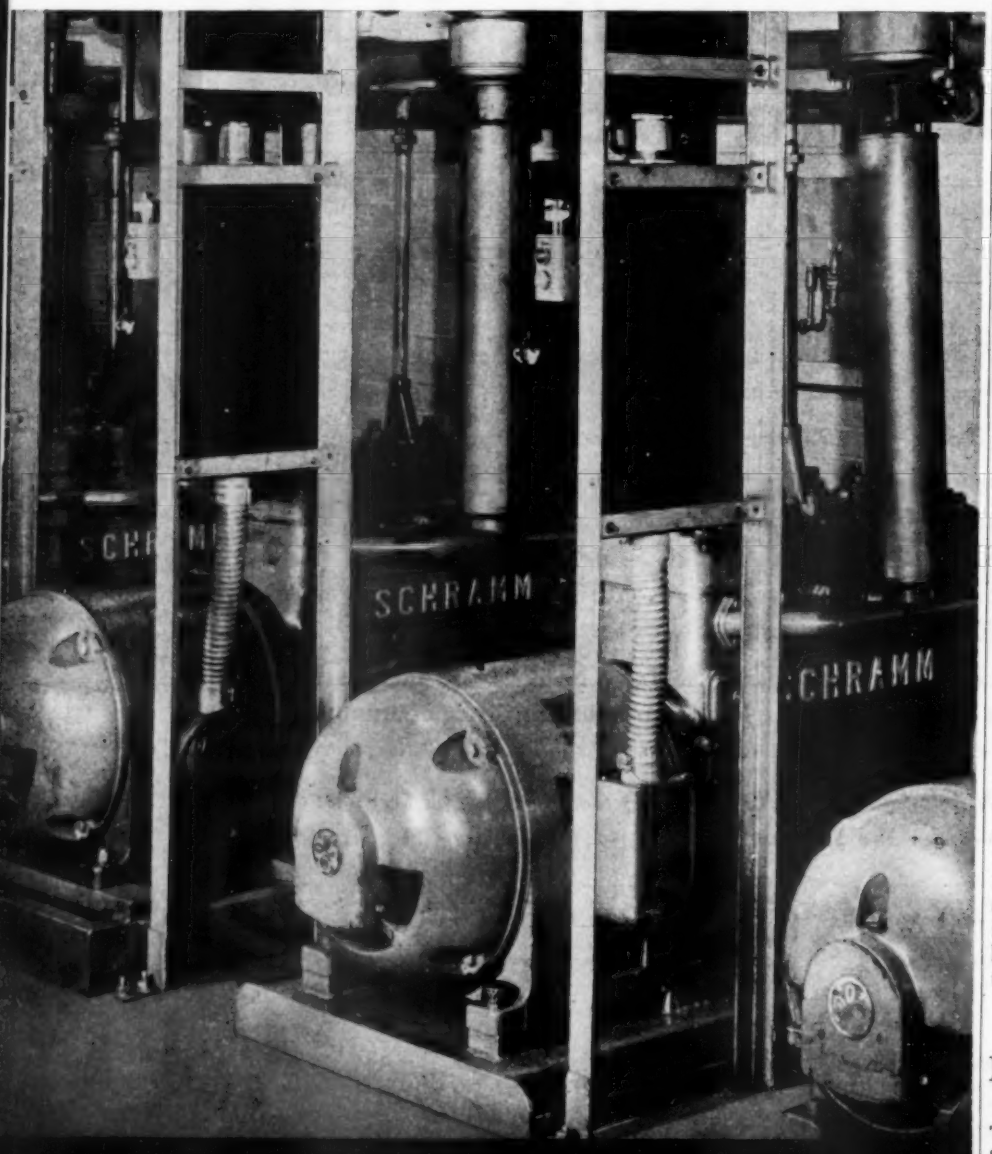
to eliminate vibration

Here's an installation showing just what can be done with an "easy-to-install," compact Schramm air compressor.

The Units represent "Utility" Compressors. Schramm compressors are available with various types belt drives, as well as built-in motor drive and direct connected diesel or gasoline engines. Other features that assure all the air you want include: 1—completely watercooled. 2—forced feed lubrication. 3—mechanical intake valve. 4—sturdy support for cylinder heads.

Specify Schramm Air Compressors in your plant and get heavy-duty continuous operation with least attention, upkeep and operating costs.

Write for full data in Catalog IND-44.



SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA

(*Concluded from page* 164)

agree with some of the policies of the OPA. He criticized the establishment of Feb. 1, 1942, for the base price and indicated that there have been wage raises since that time over which foundrymen have had no control. Payment of these wage raises must come from profits. In his opinion the base-period method should be discontinued because it is working a hardship on some organizations and that hardship will increase. In its place the formula method should be permitted. Mr. Magrath stated that the base-period method results in shifting of patterns from one foundry to another and delays in production. In conclusion, he stated that the OPA has lost sight of the fact that when profits are exceedingly low production suffers.

Following the formal program the foundrymen present held an executive session and passed a resolution outlining management's suggestions for curing the manpower shortage. The resolutions committee was composed of the following: Ray J. Redmond, chairman, secretary-treasurer of the Buckeye Foundry Co., Cincinnati, O.; Ben D. Claffey, manager, Gray Iron Division, General Malleable Corp., Waukesha, Wis.; Arthur E. Hageboeck, president, Frank Foundries Corp., Moline, Ill.

Representatives Are Appointed

Reading Chain & Block Corp., Reading, Pa., has appointed J. R. Kindig, Atlanta, Ga., manufacturers' representative for its sales of hoists through distributors in ten southern states. The company also has appointed Dunn & Bryan agents for the New York and New Jersey territories; Transmission Engineering Co. for southern California, New Mexico, Arizona and southern Nevada; and the Alaska Junk Co., Portland, Oreg., for the state of Oregon.

Maytag Co. Receives Security Award

Maytag Co., Newton, Iowa, received the National Security Award at ceremonies at its plant, May 12. The presentation was made by Maj. Gen Clarence H. Danielson, commanding the Seventh Service Command at Omaha, Nebr., and was given for the superior manner in which the plant and its personnel have been protected against fire, sabotage, accident and war attack.

Names Chicago Agent

Chas. Taylor Sons Co. has appointed Tile Craft Inc., 340 North Dearborn Street, Chicago 10, exclusive representative in that area for sale of the former's refractory products.

SPEED UP PRODUCTION OF CORES AND MOLDS WITH DELTA

PARTEX

MADE FROM NUT SHELLS

DELTA PARTEX (Nut Shell Parting) is the lycopodium replacement product so widely used by leading foundries all over the nation. It is SAFE ...ECONOMICAL and EASY TO USE.

It is superfine powder that flows like water. It dusts freely and covers all surfaces uniformly. It WORKS FASTER, SAVES TIME and LASTS LONGER.

With fewer applications patterns and core boxes stay cleaner and produce finer finished cores and molds.

DELTA PARTEX contains no harmful salts nor acid-forming properties which could, in any way, affect core boxes or metal patterns.

USE PARTEX SPARINGLY.

DELTA CORE & MOLD WASHES

DELTA THERMOKOAT WASH
It's Plasti-Lastic — For All Types of Sand Cast Metals

For STEEL
DELTA STEELKOAT
DELTA SPECIAL CORE & MOLD WASH

For GREY IRON & MALLEABLE
DELTA GRAKOAT • DELTA BLAKOAT

For NON-FERROUS METALS
DELTA NON-FERRUSKOAT

"In recognition of continued and outstanding achievements in the fight for Freedom the Army-Navy "E" has been awarded for the THIRD time."

OTHER POPULAR DELTA FOUNDRY PRODUCTS

DELTA NO-VEIN COMPOUND
DELTA SPRAY BINDERS
DELTA MUDDING COMPOUND
DELTA CORE OILS
DELTA CORE ROD DIP OIL
DELTA SAND CONDITIONING OILS
DELTA CHILLKOAT

DELTA OIL PRODUCTS CO.

Manufacturers of Industrial and Automotive Oils, Greases and Compounds

MILWAUKEE 9, WISCONSIN

WASHINGTON
* * * Notes

WPB's conviction that industrial preparations for peace must be begun in plenty of time before the fighting ends, has run into opposition from the armed services, who are fearful of the effect of reconversion planning on the immediate war effort. Specific steps proposed by WPB which primarily were responsible for recent criticism include: 1. Authorization of manufacturers, upon application to a WPB field office, to acquire materials and components to make and test a single working model of any product planned for postwar production. 2. Revocation of limitations on magnesium and aluminum use by vesting in WPB regional offices authority to permit manufacture of items from these metals as the manpower situation permits. 3. Permission to manufacturers to buy machine tools and dies for civilian production, so long as such orders do not interfere with war production.

★ ★ ★

To forestall the diversion of labor into civilian work at the expense of war production WPB regional offices would consult with the War Manpower Commission on whether or not to permit any manufacturer to produce items on which WPB restrictions are lifted. The decision would be reached in accordance with established policies on the basis of local, regional and interregional manpower requirements for war work; the extent to which war production schedules are being met or exceeded; and the relative essentiality of the proposed products.

★ ★ ★

ANOTHER criticism of these moves is that workers would be encouraged to desert war plants for civilian enterprises, a trend already stimulated by the so-called "cutback jitters." However, WPB thinks its program would give workers confidence that a smooth transition from war production to peacetime jobs can be effected; also, that it can clamp down promptly on any manufacturers attempting to beat the gun at the expense of their war work. The big job that WPB faces is to convince the public that planning for peace is not a signal to let up on war work, but that if there is no planning now the worker and manufacturer will be in a bad way when military operations become sufficiently advanced to permit sharp cuts in the overall war production program.

★ ★ ★

The probability that some manufacturers will have terminated their essential war work and be able to return to civilian production before their competitors are able to do so is something that WPB regards as "regrettable but unavoidable." The point is made that if, without interference with the war effort, a manufacturer in a noncritical manpower area can be provided materials and parts to resume production of things the civilian economy needs, it would be wrong to tolerate large-scale unemployment while waiting until a competitive concern in a critical area is able to resume production. In addition, WPB does not intend to attempt to prevent concerns from making civilian items which they did not produce before the war. The agency claims that maintenance of a competitive economy is the important consideration, and that to try to dictate who may make what would merely be

(*Continued on page* 172)

CUT OFF

GATES and RISERS in any metal

in far Less Time with

Tannewitz METAL CUTTING BAND SAWS

Variable Speed

Models to fit Every Need

In addition to our regular High Speed Band Saws delivering over 2 miles of smooth vibrationless saw travel per minute, which have proved so exceedingly popular in automotive and aviation work, the TANNEWITZ line now offers five other models to provide the fastest cutting medium for every foundry need: a 30" machine available in any 3:1 speed variation from 100:300 or 1000:3000 blade feet per minute—a similar machine with 3-step V-belt drive to give 2300, 3100, 4000 blade feet per minute—a 36" machine with 32" capacity under the guide—a model with 48" wheels and one with 52" wheels, operating at 3,000 blade feet per minute for handling extra large castings. Get a line on the TANNEWITZ metal cutting band saw that fits your particular needs. It will save time, step up production and repay its cost dozens of times. Write for full particulars NOW!

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

ANOTHER HEAVY-DUTY JOB FOR THE SULLIVAN WG-9 AIR COMPRESSOR

Making furnace plates, ladles and similar long-life pieces of steel mill equipment is a heavy-duty job. At the John Mohr and Sons plant, where this type of work is done, every tool is pneumatically operated . . . and a heavy-duty, long-life Sullivan WG-9 furnishes the air power efficiently and economically.

This precision-built compressor is designed for continuous, 24-hour-a-day service in small plants or for specialized service in larger plants. Here are some of the 25 reasons why your next air compressor should be a Sullivan WG-9 "INDUSTRIAL-AIR" —

1. **It is the ONLY single-stage, double-acting compressor with FULL FORCE-FEED LUBRICATION.**
2. **Perfect fit anti-friction main bearings and interchangeable crankpin bearing NEVER REQUIRE ADJUSTMENT.**
3. **Cylinder liners and crosshead guides are REPLACEABLE ON THE JOB, making it possible to have a "new" compressor after years of satisfactory service.**
4. **Valve cage-ports are completely jacketed for high cooling efficiency.**
5. **The WG-9 is equipped with exclusive patented Sullivan "Dual-Cushion" valves, proved by service and produced entirely by Sullivan.**
6. **The WG-9 has greater capacity per foot of floor space.**

SULLIVAN WG-9 AIR COMPRESSOR INSTALLED AT

JOHN MOHR & SONS

MAKERS OF

HEAVY-DUTY STEEL MILL EQUIPMENT

The "Industrial-Air" is built in 11 sizes, with displacements from 153 to 822 C.F.M. and pressures from 30 to 150 lbs. Bulletin A-43 contains complete details. Write to Sullivan Machinery Company, Michigan City, Ind. or any Branch office. In Canada: Sullivan Machinery Co. Ltd, Dundas, Ontario.

PRODUCTS

STATIONARY AND PORTABLE AIR COMPRESSORS FROM ¼ TO 3000 H.P., PNEUMATIC CASTING GRIPS, FOUNDATION BREAKERS, PORTABLE HOISTS, AND ROCK DRILLS.

OFFICES

Seattle, Boston, New York, Chicago, Portland, Pittsburgh, St. Louis, San Francisco, Birmingham, Knoxville, Huntington, Los Angeles, Salt Lake City, Detroit, Duluth, El Paso, Butte, Scranton, Denver, Dallas

SULLIVAN

AIR COMPRESSORS . . . *from ¼ to 3,000 h. p.*

(*Continued from page* 170)

regimentation.

★ ★ ★

LITTLE change is shown in the WMC report for July on labor market classifications. Areas where acute shortages exist numbered 68 in July against 69 in June. These represent about 20 per cent of the areas classified, although the percentage would be higher based on population or importance to the war effort. About one-third of the areas are termed sections of "labor stringency" or areas anticipating a shortage within 6 months. The remainder will have either a slight or substantial labor reserve after 6 months.

Although the foundry industry has protested vigorously against the publicity releases by government agencies which picture foundries as dirty, dark and disagreeable places where only the brawny can survive, the Washington bureaus appear loath to change their tune. A recent WMC release quotes Paul V. McNutt as saying that the foundries and forge shops need 15,000 *to* 20,000 *men "with the muscular equipment of football players," adding that "much of the work in a foundry is done in sweltering heat" and that "work done in a foundry is tough."*

★ ★ ★

MANUFACTURERS of cast iron warm air furnaces have been permitted by OPA to raise their lowest published list prices in effect Aug. 4, 1943 by 9 per cent. A like boost applies to repair parts. Furnaces affected are those with a B.t.u. output of 900,000 or less.

★ ★ ★

Five producers of cast iron bath tubs have been authorized to make 10,000 *tubs each during the third quarter. Sales will be restricted principally to war housing, hospitals, institutions, and military needs. Manufacturers involved include American Radiator & Standard Sanitary Corp., Louisville, Ky.; Crane Co., Chattanooga, Tenn.; National Sanitary Co., Salem, O.; Kohler Co., Kohler, Wis., and Richmond Radiator Co., Uniontown, Pa.*

★ ★ ★

SMALL plants are given partial relief from production quota restrictions in manufacture of civilian goods, in a plan approved by WPB. In general the plan will permit small plants to increase their operations to a rate equal to the overall industry rate of production for any given civilian item. In computing the industry rate, production for both civilian use and military end use will be taken into account. However, the plan will not affect items production of which for civilians specifically is prohibited.

★ ★ ★

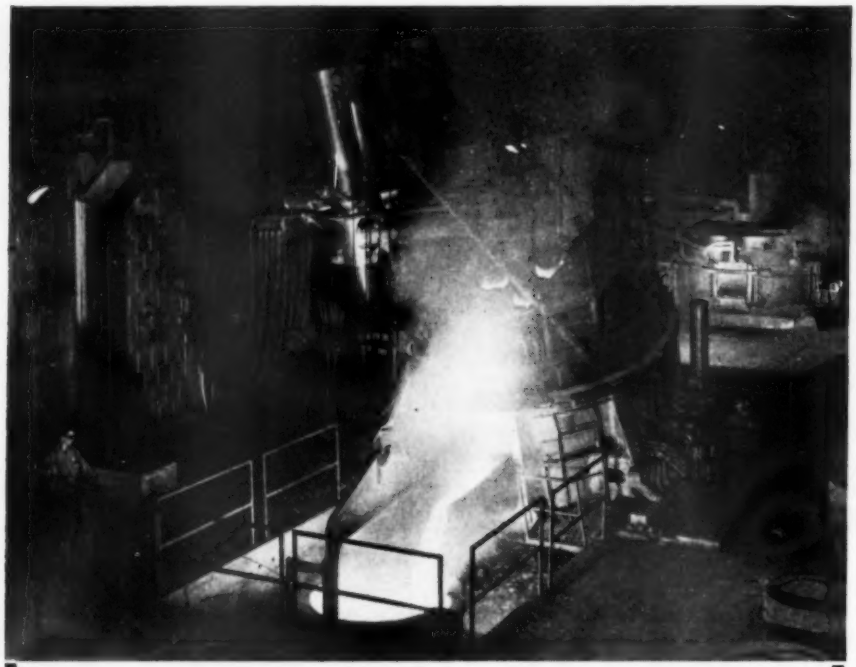
Reason for this relief to small plants is the frequent discrepancy between their operating rate and those of large interests. Under present conditions quotas of allowed production for civilian use are set by WPB limitation orders. Production of a civilian item for military use is excepted. The tendency on the part of procurement agencies has been to place military orders with larger plants, and as a result, large plants have been operating well over rated capacity. On the other hand, small plants, because of the lack of military procurements, had to be satisfied with a certain minimum percentage of their base year production.

★ ★ ★

CONCENTRATION of production of non-electric domestic cooking appliances and heating stoves has been eliminated. Manufacturers formerly were classified according to labor areas and production capacity, and the large plants, as well as those in restricted labor areas, were re-

(*Concluded on page* 174)

Malleable Prices: **OPA regulations governing alternative pricing methods that sellers of malleable iron castings may use in determining their maximum prices have been modified to permit use of either the prebase period method or the formula method on all deliveries made on orders received or contracts entered into prior to June 30, 1944. In all other cases, if the seller elects to sell or deliver castings on or after this date at his pre-base period maximum prices, he cannot afterwards shift to formula prices.**



MOORE RAPID *Lectromelt* FURNACES

★ Twenty ton heats of alloy steel are being poured by the illustrated "NT" Lectromelt top charge furnace, operating in a West Coast plant. A Lectromelt was chosen because of its economy, dependability, and ease of operation. By reducing the time between heats, Lectromelt's top charge features increase the tonnage per man hour.

Requests for more detailed information will be answered promptly.

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH, PENNSYLVANIA

Single Flask Fillers

in pairs for making drags and copes

● Bartlett-Snow Flask Fillers are available in a wide variety of types and sizes, including swinging chute flask fillers,—pivoted boom flask fillers,—stationary bin and apron feeder flask fillers (illustrated above), and various special types to meet unusual conditions.

The stationary bin and apron feeder flask fillers, most popular of the several types, are adapted readily to the floor space, head room, flask size, and other conditions of the individual installation. The bins vary in size from 5 to 20 ton capacity, and the apron feeders, at point of discharge, are fitted with deflecting plates or chutes, to spread the sand to distant corners of large flasks.

Our recently issued 40-page Bulletin No. 91, which illustrates many different types of flask fillers,—and other Bartlett-Snow Foundry Equipment,—will be of great interest to every foundryman. Send for a copy!

THE C. O. BARTLETT & SNOW CO.

6201 HARVARD AVE. • CLEVELAND, OHIO

Engineering and Sales Representatives in the Principal Cities

FOUNDRY SAND, MOLD AND CASTINGS HANDLING • • DUST AND FUME CONTROL SYSTEMS • •

(Concluded from page 172)

quired to discontinue stove production and convert to war work. Later the regulations were revised to provide for the return to production of these firms as their production was needed, but small manufacturers in less critical labor areas still were given preference in production. All companies now are classified uniformly and any manufacturer may be granted permission upon application to make stoves provided such production does not interfere with its war work.

★ ★ ★

Bronze again may be used to manufacture water meters of 1-inch size or less. A change in WPB regulations permits use of an alloy containing up to 82 per cent copper and 3 per cent tin in main casings, register boxes and lids.

★ ★ ★

PRODUCTION of track-laying tractors, power cranes and shovels, and certain other types of construction equipment has more than tripled since 1937, but heavy military demand has resulted in shortages for civilian use. Value of 1943 output was $721,690,000. Estimated 1944 production includes 30,000 tractors, 8400 cranes and shovels, and 23,000 bulldozers.

★ ★ ★

Production of wheel tractors, largely for farm use, has been ahead of schedule, although the farm machinery program as a whole has fallen somewhat behind. The lag has been small—for 11 months ended May 31 it was 10.7 per cent, against 22.7 per cent 3 months earlier. Wheel tractor production for 11 months totaled 201,539 units, compared with scheduled output of 189,767. Production of all types of farm equipment for the 12 months ended June 30 was far ahead of the best prewar year's total.

★ ★ ★

SOME 50 colleges and universities in various parts of the country will be used as training centers to educate war contractors and government representatives in the intricacies of contract settlement.

★ ★ ★

For every 1000 workers on factory payrolls in April, 68 either changed jobs or quit manufacturing work, compared with a turnover of 73 in March. Quits accounted for the largest part of all separations, totaling 49 per 1000, with lay-offs 6 per 1000. The separation rate for women in manufacturing industries was 76, compared with 62 for men.

★ ★ ★

DOMESTIC supply of metallurgical fluorspar may be 20,000 to 30,000 tons short of requirements, according to H. T. Mudd, chief of the WPB Fluorspar Section. Labor withdrawals for the armed forces are named responsible for the possible deficiency.

★ ★ ★

Ammonium silicofluoride, used chiefly by aluminum and magnesium foundries, has been placed under allocation. Foundry needs are expected to be taken care of, although there may be a reduced supply available for civilian use—principally by laundries.

★ ★ ★

LABOR may be scarce in many localities, but an average of 112,000 persons received weekly unemployment insurance checks in March. First quarter new claims for unemployment benefits were 32.7 per cent less than a year ago, and total benefits of $18,777,510 paid out during that period were 44.4 per cent less. Nor is this the full picture of unemployment, since only about four out of five workers have jobs enabling them to earn unemployment insurance credits.

W.G.G.

Steel Cutting Guide

Air Reduction, 60 East Forty-second street, New York 17, has prepared a handy pocket-size, slide-type guide which shows proper tip sizes, gas pressures and other data required for machine cutting steel of various thicknesses with two of the firm's most widely used gas cutting tips. Back of the guide lists helpful hints for operators including setting-up, piercing starting holes, making heavy cuts, etc. Copies of the guide may be obtained free by writing to the firm, or any of its branch offices.

Nitralloy Corp., 230 Park avenue, New York 17, has published a 46-page booklet by D. Landau entitled, "Wear—A Discussion of the Mechanism of Wear Phenomena and Influencing Factors."

The machine *that whipped a walkout*

The job was tough as the men on the foundry floor very well knew. Here they were—wielding heavy sledge-hammers, pounding out castings from dusty, hot molds. But the work was urgent . . . the castings vital.

The men stood it as long as they could. But, finally, they just couldn't take it any longer. Either some way must be found to ease up on this method of emptying flasks—or they would just have to quit.

Management was ready. They told the men that a Robins Floatex Shakeout had been ordered . . . that shipment was promised within a month . . . that there would then be no more sledge-hammer pounding to clean out the flasks. The Floatex would do it mechanically, quickly, effortlessly. The men agreed to wait.

Robins delivered the Floatex well within the time limit. Being a Portable model, it went to work at once. Took 3 minutes to shake-out a 4-ton flask. The same job that had taken two men with sledges 40 minutes to do. The walkout was whipped then and there.

That was Monday. On Saturday, the plant was able to close for the week-end. The men had caught-up with their work. They enjoyed the first rest period in many months. So did the payroll.

You may not be facing a walkout. But you certainly do face a shortage of man-power. Every foundry does. Floatex Shakeouts are relieving this shortage by relieving a big burden—a necessary burden in every foundry. Many shops are hiring 17-year-old boys . . . even women . . . in the shakeout department, thanks to Floatex. We'll give you full facts about this full-floating Foundry Shakeout if you'll address Dept. F-8.

The Floatex Shakeout is genuinely full-floating—vibrated deck and superimposed load ride on heavy-duty coil springs. No extra-heavy foundations; no costly damage to flasks; no cracks in foundry walls. Shakes the flask—not the building. Made only by Robins. Portables to 17 tons; Standard for 1 ton to 100 tons and more.

ENGINEERS • MANUFACTURERS • ERECTORS

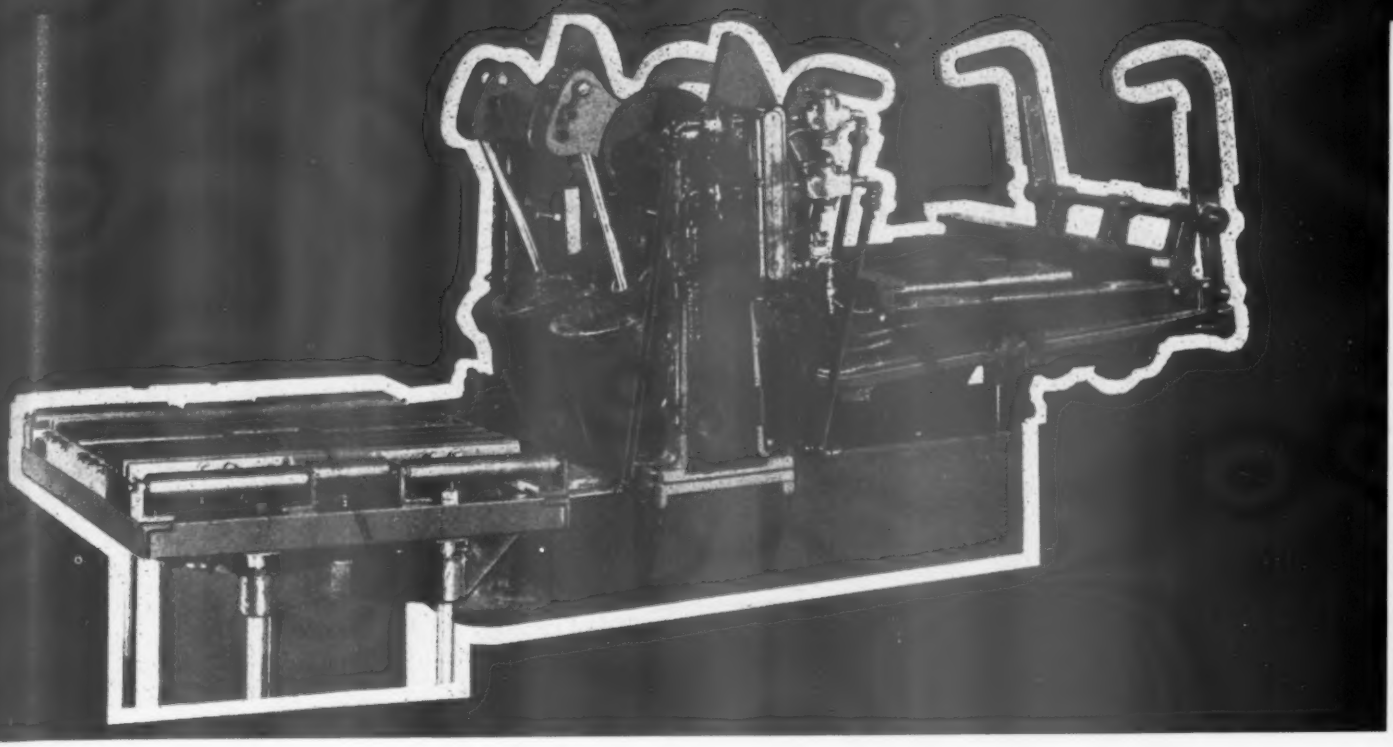
ROBINS CONVEYORS INCORPORATED

Founded in 1896 as Robins Conveying Belt Co.

PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . It's ROBINS



Type A Power Clamp, Power Turnover, Power Draw Machine for handling core boxes up to 55"x92" — 25" Draw. Designed for a HIGH PRODUCTION foundry making steel castings for WAR WEAPONS

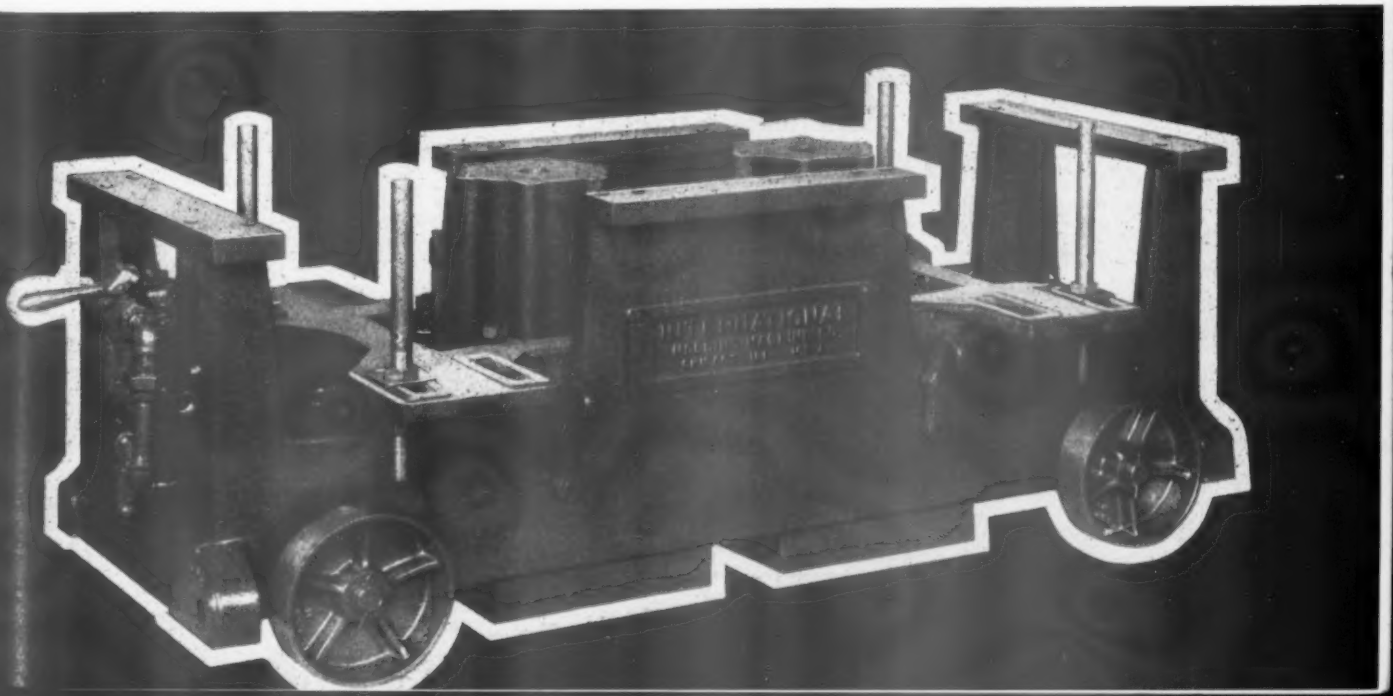
INTERNATIONAL MOLDING MACHINES

70 STANDARD TYPES — 900 DIFFERENT SIZES

Type LP Power Pin Lift Machine built for HIGH SPEED production of Aluminum Castings in flasks 30" x 90"

INTERNATIONAL MOLDING MACHINE CO.

2608 — 2624 WEST SIXTEENTH STREET, CHICAGO, ILLINOIS



ELECTRIC METAL GUILD

Holds Annual Convention

MEMBERS of the Electric Metal Makers Guild Inc., holding their twelfth annual convention, June 2-3, at Hotel Schroeder, Milwaukee, derived considerable satisfaction in that during the past year electric steelmaking has met all war demands and with some margin to spare. Nevertheless, there was no evidence of self-praise for this achievement—instead a deep realization that obligations are not fulfilled until the war reaches a successful conclusion.

With a meeting attendance of 80 company member representatives, a new record was established. This was further proof that the industry has numerous problems in the development and manufacture of electric furnace metals crying for solution. Chief among these are growing manpower shortage and increasingly inferior raw materials. Electric furnace operators have done a magnificent job in training needed skilled workers, but now the obstacle is the lack of men to train.

Throughout the two days of sessions, Lieut. Col. G. L. Cox, Office of Chief of Ordnance, Washington, conferred with members, after formally addressing the opening meeting. Luncheon speaker on the first day was C. L. Levy, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., on "Rototrol". During two periods, members of the ingot and casting sections held simultaneous group sessions for discussions on operating procedures and problems peculiar to their type of melting. Ingot sessions were under the chairmanship of Edward J. Chelius, Carnegie-Illinois Steel Corp., Duquesne, Pa.; and casting sessions were conducted by Martin T. McDonough, National Malleable & Steel Castings Co., Sharon, Pa.

Alex C. Texter, superintendent of melting department, Atlas Steels Ltd., Welland, Ont., was elected president of the Guild, succeeding James Sweitzer, superintendent, Sivyer Steel Casting Co., Milwaukee. Joseph A. de Bondy, Manitoba Steel Foundries Ltd., Selkirk, Man., was named vice president, and John E. Arthur, superintendent of melting, Park Works, Crucible Steel Co. of America, Pittsburgh, was re-elected secretary-treasurer.

Members of the executive committee are: Retiring President Sweitzer; H. F. Walther, electric furnace superintendent, Timken Roller Bearing Co., Canton, O.; A. G. Gierach, personnel and safety director, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill.; H. E. Phelps, electric furnace superintendent, Rotary Electric Steel Co., Detroit; Fred J. Blaney, general superintendent, Ohio Steel Foundry Co., Springfield, O.; and H. C. Bigge, Bethlehem Steel Co., Bethlehem, Pa.

At the dinner, tendered by Sivyer Steel Casting Co., Mr. Phelps served as toastmaster.

SAHARA

"ASK THE MAN WHO RUNS ONE"

CONSIDER THIS . . .

Hot sand shake-out conveyors are the toughest belt punishers in your industry . . . RIGHT?

TOUGH! YES! But SAHARA takes this job in stride. Send for outstanding performance records citing verifiable dates and data.

REXALL is equally good for cold sand and castings.

IMPERIAL BELTING COMPANY

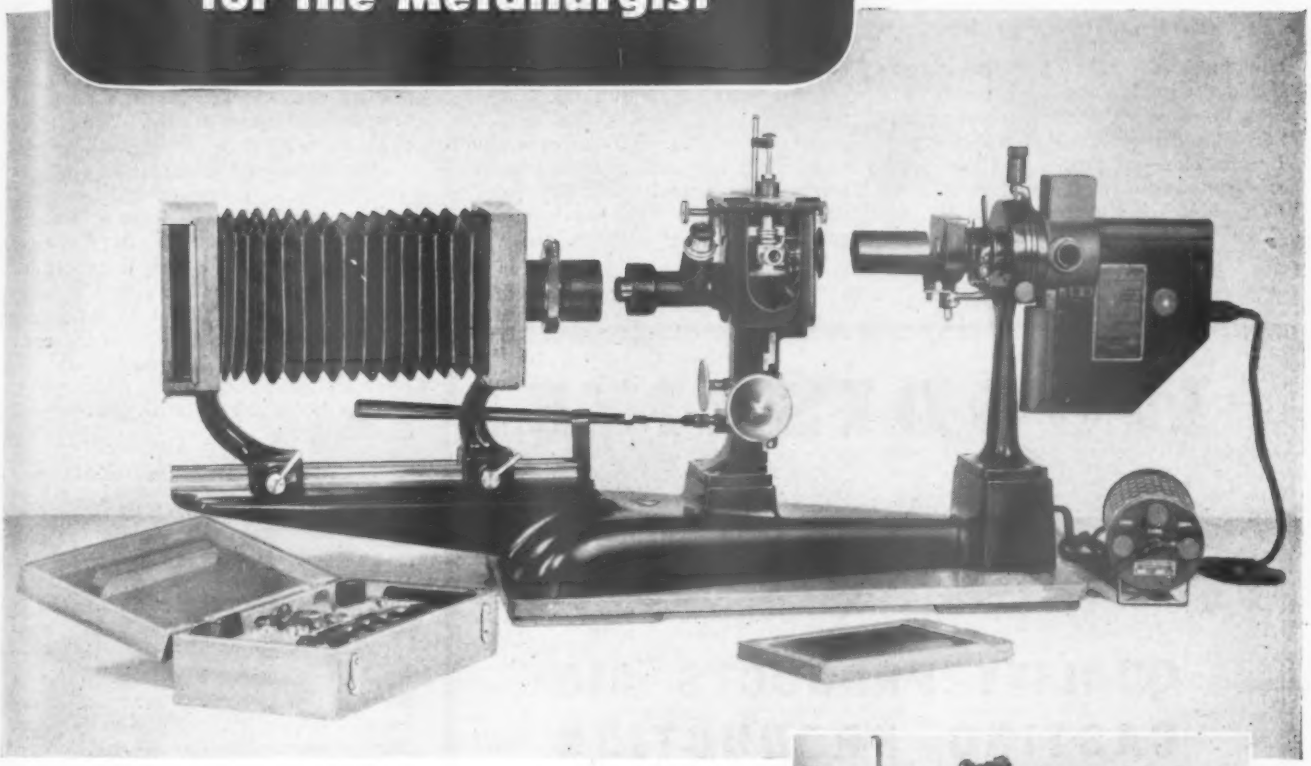
1750 S. KILBOURN CHICAGO 23, ILL.

Standard Established For Mineral Wool

National Bureau of Standards, Washington, has promulgated Commercial Standard CS117-44 for Mineral Wool Blankets, Blocks, Insulating Cement, and Pipe Insulation for Heated Industrial Equipment. Until the standard is printed by the Government Printing Office mimeographed copies may be secured from the Mineral Wool Institute, 441 Lexington Avenue, New York 17, when requested on company letterhead stationery.

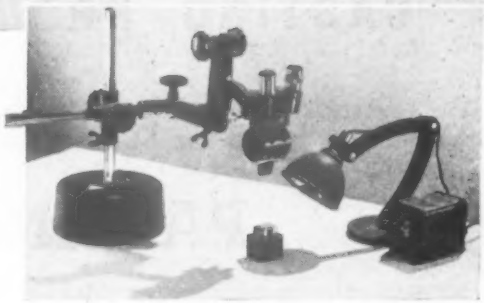
The eighth annual Time and Motion Study Clinic conducted by the Industrial Management Society will be held Nov. 2-3 at the Medinah Club, Chicago, for engineers, executives and supervisors. The clinic theme will be "More Production with Less Effort."

Buehler Optical Equipment for the Metallurgist



Metalloscope B&L—MILS for visual observation and photography . . . bright field work

This equipment consists of a special inverted microscope and a photographic camera with suitable light source mounted on one rigid base. The inverted microscope is fitted with vertical illuminator having both plane glass and prism reflector. The mechanical stage is a regular feature. A wide range of objectives and eye pieces is available for both visual and photographic work. The camera plate opening is 5″ x 7″ with kits for 4″ x 5″ and 3¼″ x 4¼″. Sufficient extension is provided for photographic magnifications according to ASTM standards of 25X to 2000X with objectives and eyepieces regularly listed.



Wide Field Binocular Microscope—No. 2230 B&L—SKW-5 with reflector lamp

Affords a wide field; realistic three-dimensional vision for the inspection of small parts. This piece of apparatus has unlimited use and should be a part of the equipment in every metallurgical laboratory. The complete outfit as illustrated consists of prism body; drum nosepiece; 3 objectives and 2 sets paired eyepieces to provide approximately 7X to 45X or higher. Reflector lamp can be supplied as a separate item.

THE BUEHLER LINE of optical equipment for the metallurgist includes microscopes • spectrographs • macro cameras • magnifiers • metallographs and other essential apparatus.

Adolph I. Buehler

OPTICAL INSTRUMENTS

228 NORTH LA SALLE ST., CHICAGO 1, ILLINOIS

MAGNESIUM CASTINGS BY DODGE CHICAGO

(*Continued from page* 81)

equipment of each of five similar units includes two 2000-pound capacity premelt furnaces and five superheating furnaces accommodating 425-pound capacity crucibles—all gas-fired. Close check is maintained over melting operations, temperatures being recorded in the enclosed control room shown at the right in Fig. 4. Operators in this station are able to observe the temperature of each melt continuously until it is poured into the molds. In addition, signals are given from the control room to the furnace tenders to direct them when to remove the crucible from the furnaces and when to pour.

Magnesium castings made by the Dodge Chicago Plant conform to Aeronautical Material Specification 4424B, the ingot being an alloy having an average composition of 6 per cent aluminum, 3 per cent zinc and the remainder magnesium. Care is exercised to charge only clean scrap with the ingots. All gates, risers, scrap castings, etc., to be remelted are sand-blasted, principally to remove any adhering sand which might be reduced by the molten magnesium and cause an increase in silicon content of the melt beyond the specincation maximum of 0.30 per cent. Crucibles are coated on the exterior with aluminum to reduce scale and prolong their life.

The premelt furnace charge is protected against burning by use of a proprietary flux, and brought to a temperature of 1300 degrees Fahr. After thorough stirring, it is transferred to the smaller superheating furnaces, and the temperature is raised to 1650 degrees and held for 10 to 15 minutes for the grain refining treatment. At the conclusion of the superheating the crucibles are removed and allowed to cool to pouring temperature of 1300 to 1450 degrees, depending on the size of the casting to be poured. The flux is scraped away and a sulphur mix is sprinkled on the surface of the metal to prevent oxidation.

Temperature Is Controlled

Castings are poured at stations adjacent to the furnaces, and the molds are brought into position on roller conveyors, as shown in the case of larger castings in Fig. 1. A pyrometer is held in the crucible during pouring, thereby providing a check of the temperature at which each casting is poured. Prior to pouring the larger castings, air is exhausted from the mold cavity by introduction of sulphur dioxide gas. Pouring basins, made of dry sand, are made sufficiently large to assure a steady stream down the gate, and, as indicated in Fig. 1, metal from the crucible is directed at the opposite end of the pouring cup from its point of introduction into the mold. Tensile test bars are cast from each heat for subsequent examination as part of the close control exercised over the chemical and physical properties of all castings. An exhaust-equipped hood for confinement of the larger molds after pouring, effectively removes smoke and fumes as the castings cool, as is evidenced in Fig. 1.

Castings are broken out of the molds at four shakeouts and taken by monorail conveyor to the cleaning department, while the sand is conveyed by belt to the reclaiming system. The latter operates continuously, processing about 16 tons of used sand per hour. As the sand arrives at the system, an operator picks larger pieces of metal from the belt, as shown in Fig. 6. A magnetic pulley and screen remove ferrous and other bulky foreign materials before the sand is dumped into the top of a 300-ton capacity storage bin, only one edge of which is visible at the right in Fig. 6. From the bottom of this bin sand is fed by bucket elevator to the top of the round processing furnace (not shown in Fig. 6). Purpose of this furnace is to subject the sand to a sufficiently high temperature to burn out remaining combustible materials, including binder and oil, and to remove excessive fines.

Interior of the unit consists of a series

(*Concluded on page* 180)

WOODISON'S

6

QUALITY PRODUCTS AID CASTING PRODUCTION

★

CORE OIL

★

PARTING

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CORE PASTE

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CORE WASH

★

CORE COMPOUND

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SEA COAL

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Woodison

E J W CO.

THE E. J. WOODISON CO.

7515 St. Aubin Detroit, Mich.

Branches: Buffalo and Philadelphia

THIS FOUNDRY SYSTEM HAS BEEN GROWING SINCE 1926

During pouring time, when minutes count, is when Cleveland Tramrail equipment is especially helpful.

The first installation of Cleveland Tramrail at the Pohlman Foundry Co., Buffalo, New York, was purchased in 1926. Every few years since that time their system has been extended. More rail here — another crane there — perhaps a few new chain or electric hoists.

"We here at Pohlman are pretty much sold on Cleveland Tramrail," says the foundry engineer.

Obviously overhead materials handling equipment has proven advantageous to Pohlman. Equally obvious must be the fact that Cleveland Tramrail has been serving this company satisfactorily for 18 years.

Cleveland Tramrail is at work in every department of this important foundry. It is especially advantageous when pouring. By means of the overhead rail system metal is easily conveyed with safety from cupola to the various floor sections and transferred to smaller pouring ladles. The latter are pushed to the molds on individual carriers.

The overhead system not only eases the work and aids safety during pouring, but it is a big factor in improving the efficiency of sand handling, mold making, shakeout, sand blast and other work.

(Above) *Keeping the small pouring ladles full is easy and safe. Scampering long distances with hot metal is eliminated.*

(Right) *Heat loss is kept at a minimum because the metal is taken directly from cupola to pouring floor quickly via the smooth overhead tracks.*

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 East 283rd St. Wickliffe, Ohio.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

(*Concluded from page* 178)

of levels or hearths around which paddles revolve, constantly stirring the sand and exposing it to the heat provided by gas burners which lines the periphery of the furnace at the various levels. Small openings in each hearth permit the sand gradually to drop to succeeding levels. Meanwhile an exhaust removes and collects the fine particles. Temperature at the top hearth is 1250 degrees Fahr., this being reduced steadily to 800 degrees at the bottom level. Here the sand enters a cooler, and its temperature is brought down to 160 degrees by an air blast before it leaves the system to be returned by belt conveyor to the preparation station for reuse in the system.

Fig. 5 shows a small portion of the cleaning department where castings are rough cleaned on benches after gates and risers first have been removed, and the castings have been sand blasted and given a preliminary inspection. Again traveling by overhead conveyor the castings are taken to the polishing booth for additional finishing. These booths are well hooded and equipped with exhausts to entrap in water the small magnesium particles removed during buffing.

Castings and their corresponding test bars are given solution and precipitation heat treatments in electric furnaces to raise the tensile strength from the as-cast value of about 24,000 pounds per square inch to approximately 36,000 to 40,000 pounds. Additional strength and hardness but somewhat lower ductility are provided by the precipitation or ageing treatment compared with the solution treatment alone. The latter involves heating for 12 hours at 730 degrees Fahr., and adds 8000 to 12,000 pounds to tensile properties. After air cooling, the castings are placed in ageing furnaces, and held at 350 degrees for 16 hours. At the conclusion they again are air-cooled, and after sand blasting are ready for testing and corrosion-resisting plating.

Testing includes pressure testing for porosity, targeting for accuracy of dimensions, and hardness testing. Minimum specified brinell hardness of these castings is 65. Castings are cleaned and then plated, the latter consisting of immersion for ½ to 2 minutes in a dichromate solution, followed by a water rinse. After a final inspection the foundry operations are completed and the castings are trucked to the machine and assembly shop.

8 OUT OF 10
are repeat orders

Transite Core Plate Users come back for more!

HERE'S why Johns-Manville Core Plate changes one-time buyers into long-time customers:

Light Weight: Transite Core Plates light weight means easier handling, increased production.

Less Breakage: Their fibrous nature provides unusual shock resistance, minimizes breaking and cracking.

Easily Cleaned: Transite Core Plates are actually self-cleaning when both sides are used alternatively.

Economical: These J-M plates combine low initial price, low handling costs and long life.

Low Warpage: Maximum warpage on plates under 24" is 1/64" on either dimension. On plates over 24", warpage will not exceed 1/64" in 24" length and width.

Corrosion-Resistant: These Transite plates are made of an asbestos and cement combination. They cannot corrode.

Non-Metallic: No critical materials used.

Write for Brochure PP-10A. Johns-Manville, 22 E. 40th St., New York 16, N. Y.

JM Johns-Manville
TRANSITE Core Plates

Aluminum Institute Reprints Book

Aluminum Research Institute, 111 West Washington street, Chicago 2, has reprinted the second edition of its *Standard Methods for the Sampling and Analyzing Aluminum and Certain Aluminum Alloys.* The book 8½ x 11 inches contains 30 pages printed on one side only gives detailed information on methods for determining chromium, copper, iron, lead, magnesium, nickel, silicon, tin, titanium and zinc. Copies may be obtained from the institute for 60 cents.

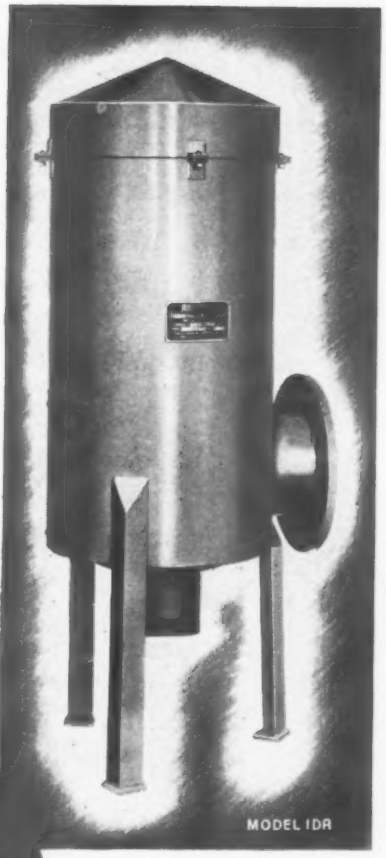
Towmotor Celebrates Anniversary

Twenty-fifth anniversary of the Towmotor Corp., Cleveland, was celebrated there May 12 with a banquet in honor of its employes. The 800 men and women who attended were presented with a book published by the corporation describing its history from the time it was founded by F. W. Sears and his son, Lester M. Sears. The latter, now president, presented watches to employes with 10 or more years of service.

Welding Calculator

Lincoln Electric Co., Cleveland, has designed a calculator for readily determining the welding preheating and interpass temperatures for various types of steels containing up to 5 per cent nickel, 6 per cent chromium, 1.50 per cent molybdenum and 3 per cent manganese. Calculator is 6¼ inches in diameter with 4 movable sections of heavy cardboard. Price of the calculator is 25 cents.

new STAYNEW Intake Air Filter



Exclusive Radial Fin Construction Provides:

- ★ More Filtering Area
- ★ Greater Efficiency
- ★ Less Resistance
- ★ Less Frequent Servicing

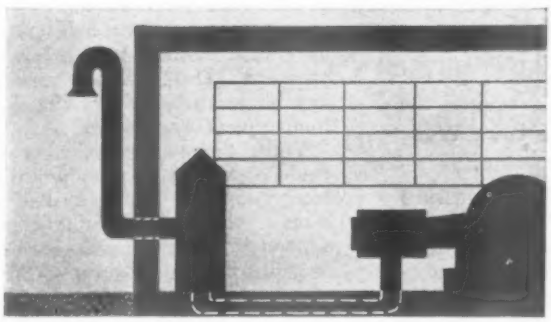
ALL THE CONVENIENCE OF GROUND LEVEL INSTALLATION

ALL THE EFFICIENCY OF HIGH LEVEL AIR INTAKE

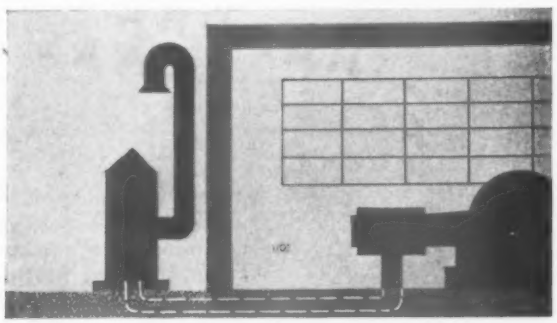
NOW you can equip compressors and internal combustion engines with a Staynew filter providing all the recognized advantages of the famous Protectomotor line . . . *plus* an exclusive combination of two new features.

The new filter, Staynew Model IDR, or IDRS (Silencer), is so constructed that *installation and servicing can be effected at ground level* (right in the engine room itself if preferred), and the *actual air intake located at the most suitable point*.

Models available with solid base for installation when compressor or engine intake is below floor level.



Model IDR INSIDE Engine Room



Model IDR OUTSIDE Engine Room

Engineering Data on request STAYNEW PROTECTOMOTOR FILTERS **Representatives in Principal Cities**

DOLLINGER CORPORATION

(Formerly Staynew Filter Corporation)

36 Centre Pk.
Rochester 4, N. Y.

HANDLING MATERIALS AT CRANE FOUNDRY

(*Continued from page 77*)

room in another part of the foundry. Each two molders have behind them two transfer cars with roller conveyor top. When the drag is made, it is p'aced on a car by an overhead trolley hoist, hand operated. Next, the core is set, after which the cope is brought from the molding machines and placed on the drag. The transfer car then is rolled to a point in front of any one of four stationary pouring conveyors and the mold pushed off onto the rollers of the conveyor.

Attention may be called to the fact that the pairs of molding machines are so placed that when it is desirable to operate in duplex, that is, to make the drag on one and cope on the other, this may be done by using one of the two transfer cars.

Steel for pouring the molds is tapped from one of the electric furnaces into a ladle—the largest being 5-tons—and handled by overhead crane to a ladle transfer car. The car and ladle are moved a distance of 25 to 30 feet into the foundry bay where the ladle again is picked up by the overhead crane and the metal poured into the molds on the stationary roller conveyors previously described.

After partial cooling on the stationary conveyors, the molds are pushed off onto the surrounding mold conveyor which consists of a series of roller-top cars tied together in an endless chain. The molds travel around this in clockwise direction until they reach a point where they are picked up by bails suspended from an overhead trolley conveyor and carried to the shakeout. Speed of the overhead trolley conveyor is controlled so that each pair of pick-up bails is synchronized to a car on the mold conveyor. A manual means of adjusting synchronism is provided should the two conveyors get out of step. The mold conveyor speed is 10 to 30 feet per minute and the complete circuit about 400 feet, which allows additional time for cooling of the molds.

In passing over the shakeout, the flasks are held by the bails and merely brou ht in contact with the top of the shakeout machine screen. After the sand and castings fall out, empty flasks continue to be held in the bails and are carried back over the center of the mold conveyors where they are deposited. Traveling around the conveyor to the opposite side adjacent to the molding machines, the flasks are pushed off onto any one of eight stationary roller conveyors to return to the molders.

Equipment Eliminates Labor

Crane Co.'s sand preparation and handling system is modern and complete in every respect. Through mechanization, important labor saving is derived. Adequate supplies of sand are available at all times from a three-compartment storage bin, two compartments for backing sand and one for facing sand. From the shakeout, sand is taken by underground 20-inch crossbelt conveyor to a 30-inch underground magnetic belt, and from it by a sand elevator to a breaker screen overhead. Then the sand goes to a 36-inch bin belt which distributes to a three-compartment storage bin.

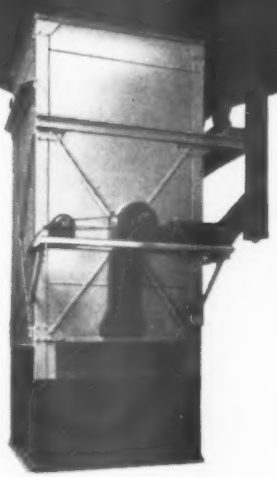
Under the storage bin are two apron feeders. Movement from here is to a 30-inch tempered sand crossbelt to the aerator. From the aerator it passes to a 24-inch tempered sand crossbelt, then to a distributing conveyor at the end of which is a surplus sand chute. Sand beyond that needed for the eight backing sand hoppers at the molding stations is discharged through the chute to a surplus belt and travels back on it approximately in line with the shakeout. Here it drops through the floor to an underground surplus sand belt which discharges onto the 30-inch magnetic belt mentioned previously.

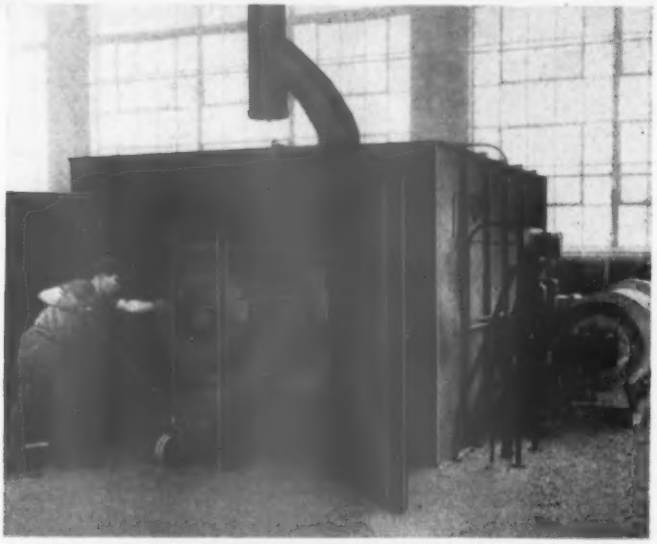
Facing sand is made up of part reclaimed sand and part new sand with necessary binders. In its preparation, feeders can dump sand into the traveling weigh hopper from either the bin containing old sand or that containing

(*Continued on page 184*)

Snagging Wheels
...THAT "HOG-OFF"
EXCESS METAL FAST
. . . Yet Give Long Wear
If you've never seen Dayton Snagging Wheels in action—we suggest you arrange for an immediate demonstration.
As hundreds of foundries have discovered — to their profit — Dayton's not only "hog-off" excess metal fast, but "wear long"—the way you want them to.
Made to the size, shape, grain and grade to suit your requirements. Write today.
SIMONDS WORDEN WHITE CO.
710 Negley Place, Dayton, Ohio
Manufacturers of
DAYTON GRINDING WHEELS

WHERE EXPERIENCE IS OF FIRST IMPORTANCE





There are few pieces of industrial equipment in the design and manufacture of which first hand experience and "know how" are of such vital importance as in industrial ovens. Factors which are seemingly negligible to the inexperienced often have far-reaching effects in the actual performance of an oven when finally put into service. Seldom do any two ovens, even in the same plant, operate under identical conditions. Allowance must be made for all the variables if maximum baking speed and economy are to be realized.

In addition, the oven design must take into consideration the probable future changes in the user's product and be flexible enough to accommodate such changes.

If you want maximum oven effectiveness and highest baking speed, take advantage of the broad experience of oven engineers who devote all of their effort to this branch of engineering and have proved their ability.

YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

YB CO

(*Continued from page* 182)

new sand. Sacks of binder are added into the weigh hopper. This hopper discharges into one of two mixers or mullers which in turn discharge onto a 24-inch milled sand belt to an 18-inch milled sand crossbelt feeding the facing sand elevator.

This elevator drops sand through an aerator which discharges onto an 18-inch facing sand crossbelt. From here the sand is discharged onto an 18-inch facing sand distributing conveyor which feeds eight facing sand hoppers located adjacent to the afore-mentioned backing sand hoppers at the molding stations. Surplus facing sand is discharged onto the same surplus sandbelts that handle excess backing sand. These belts, which are below both distributing conveyors, return the surplus to the main three-compartment storage bin.

From the shakeout, castings slide down a chute from which they are removed by placing a chain sling around the gate or riser, and hooking the chain onto a trolley conveyor, function of which is to provide cooling time for the castings. The conveyor travels over a fairly long winding path through an enclosure where during hot weather the castings are sprayed with water to hasten cooling. Emerging from this enclosure, the conveyor rises to a balcony and conducts the castings through a sandblast room where the sand adhering to the castings around the gates and risers is blasted off to facilitate cutting the castings free with oxyacetylene torches.

The conveyor at this point makes two U-shaped loops around which the cutting stations are located, and the balcony floor in the center of the U's is cut away so that annealing cars can be spotted on short loading tracks on the ground level below. Torch operators stand sufficiently far apart that while cutting a casting they can follow its travel on the conveyor. As the castings are cut free, they drop over the edge of the balcony onto one of the two annealing cars. Gates and risers remain in the chain slings on the conveyor and are carried down to floor level at a point adjacent to the shakeout where they are taken off by hand and loaded into suitable trucks to be returned to the electric furnaces for remelting.

In advance of spotting annealing cars on the two loading tracks, large castings are placed around the car edges to provide in the center a pocket for the smaller castings dropping from the balcony. When a car is fully loaded, it is withdrawn from the loading tracks by an electrically-operated transfer car and charged into one of seven furnaces for annealing of the castings. These furnaces, which have chambers 8 feet wide, 4 feet high and 16 feet long, are gas fired, but have fuel oil as standby.

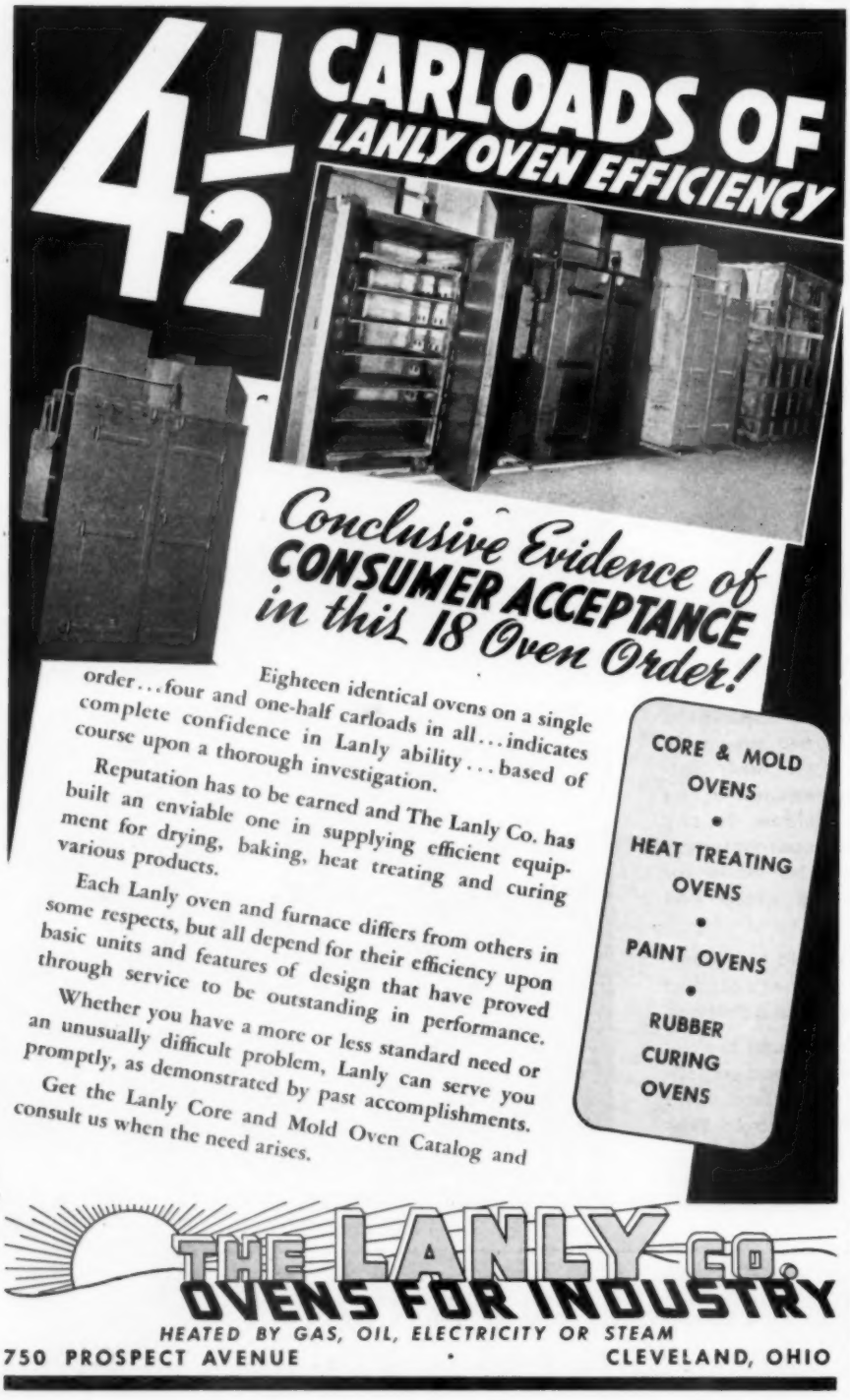
Castings Are Annealed

After remaining in the furnace the proper length of time for proper annealing of the castings, the car is removed by the same transfer car and placed on one of four cooling tracks. When the castings are cooled sufficiently, the car again is shifted by the transfer car to one of three unloading tracks where the castings are unloaded by a magnet operated from an overhead 10-ton crane and delivered to one of five sandblast rooms or one of two rotary blasting machines.

Three of the five sandblast rooms are of such construction that the load is put in from one end and removed from the other. These rooms are served by a gantry crane carrying baskets into which castings coming out of the sandblast are deposited and taken over to two 32-foot long parallel roller conveyors. The other two sandblast rooms receive and discharge the castings from the same end, and immediately in front of their loading tracks is a roller conveyor on which baskets of cleaned castings are carried to the two parallel roller conveyors. The two rotary blasting machines are served by a small car on a track, and castings following cleaning are loaded into baskets for movement to the parallel roller conveyors.

The two parallel roller conveyors converge at one end on a double transfer car to take baskets from either of the two. Baskets rolled onto this car are picked up automatically by a trolley conveyor, function of which is to transport the annealed and blasted castings through the cleaning room located in an adjoining

(*Continued on page* 186)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HIGH SILICON IRON "JISCO"

THE JACKSON IRON & STEEL Company
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(*Continued from page* 184)

building. It passes from the foundry to the cleaning building through a closed bridge at elevated level. This conveyor, designated as the main conveyor, is of unusual interest because of its great length and devious path in the cleaning department. A round trip of the main conveyor requires 8 hours.

The cleaning room is divided into three sections for small, medium and heavy castings. Since cleaning operations are essentially the same for all, except that handling procedure is varied as required to meet the conditions imposed by casting size, this description will be confined to the medium class. A point to be noted is that in cleaning every effort is made to reduce manual handling by utilizing gravity as the means for progressing castings from one operation to the next.

Entering their proper section of the cleaning room, these castings are discharged into a castings bank on the floor at the starting end. From this bank, castings are picked up by means of hand-propelled cranes and placed on the receiving bench for four snagging grinders. From these grinders, castings are passed through chutes to a bench at lower level for rough chipping and then passed by hand to the finishing chippers.

Imperfections in the castings which require welding show up at this stage. Therefore, installed over the chipping benches is a hand-propelled crane with electric hoist for handling baskets into which the finish chippers segregate castings that need welding and those that do not. The castings not requiring welding are placed on a roller conveyor which serves two double-wheel fin grinders where fins not easily chipped off are ground off. From these fin grinders, the castings are taken by electric hoist traveling on a monorail which interlocks with one of the previously mentioned hand-propelled cranes to allow baskets to be suspended back on the main conveyor and the castings to be carried to a bench for internal grinding with portable grinders.

Now back to the castings requiring welding. As they come from the finish chippers, they are deposited in baskets and carried by the traverser, or hand-propelled crane with electric hoist, to one of two roller conveyors, each serving two turntables and welding booths. Welding is performed on these turntables. From the welders, the castings go into hoppers, through a second snag grinding, again into hoppers to fin grinders, and thence to chipping benches. After chipping, the castings are transported by hand to another bench for internal grinding with portable machines. Should further imperfections show up at this point, a monorail interlocking with a traverser crane is provided to retransport the castings back to the welders for reworking.

Castings Are Checked

Having cleared the bench where portable grinding is performed, the castings are taken by the traverser to an area set aside for "accumulation of runs" to be inspected and weighed. From this point, castings are checked against order and subsequently sent to the machining department by trucks.

Retracing our steps now to the castings which required no welding and which we left just after they had passed from the fin grinders and were loaded in baskets on the main conveyor headed for internal grinding with portable machines, we pick them up again at the grinding benches. These benches are situated in the north section of the cleaning department at a point somewhat remote from the operations previously described. Removed from the main conveyor, the castings are ground internally with the portable units, inspected, reloaded into baskets, and placed on the side of the main conveyor going the opposite direction from whence they came, to be removed when they reach the "accumulation of runs" area.

In case imperfections to make welding necessary are revealed during internal grinding, the castings are replaced on the main conveyor to ride the loop. When they arrive at the station adjacent to the welders, they are removed for reprocessing.

Furnaces for heat treating castings are located in the cleaning department building. These furnaces are modern and capable of treating large tonnages of various compositions. In addition to being an-

(*Concluded on page* 188)

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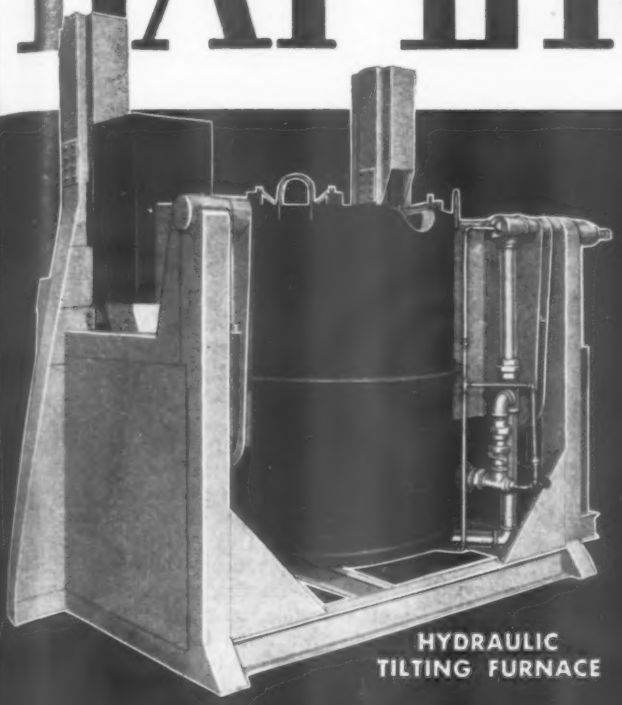

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AS DEFINED BY WEBSTER: experience (eks- pĕri- ens), n. knowledge gained by trial and practice; test; practice.

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STROMAN ENGINEERING SERVICE is at your service to help solve all or any of your metal melting or foundry layout problems. Take advantage of it . . . send your troubles to Stroman . . . their engineers with years of Experience will gladly advise solutions . . . and remember Stroman . . . the Furnaces that Experience Built are available in most any desired size, for the melting of Brass, Bronze, Aluminum, Magnesium and all other non-ferrous metals.

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(*Concluded from page* 186)

nealed, as previously described, castings must be normalized by cooling outside the furnace, and given draw or tempering treatments to produce the required mechanical properties. To fulfill their mission efficiently, the furnaces must permit accurate regulation of temperatures and be provided with adequate mechanical handling facilities.

The furnaces are gas fired and of car-bottom type, each with a capacity of approximately 15 tons. Extra cars permit loading castings preparatory to heat treatment, or cooling loads removed while others are being treated. Cars are moved by a transfer lorry and are equipped with heavy heat-resisting grids to raise the castings off the floor of the car to permit free circulation of gases under the load.

Because it is impractical or inconvenient to pour both large and small castings from the same melt and pouring ladle—largely a metal temperature matter, and because some orders require steel of special composition, such as stainless steel—the Crane foundry has a separate molding floor for small castings. In this department, which is adjacent to the arc furnace foundry, steel is melted in six electric induction furnaces, one of 2000 pounds capacity, four of 1000 pounds, and one of 650 pounds. Three of the 1000-pound units have been installed recently to provide additional capacity.

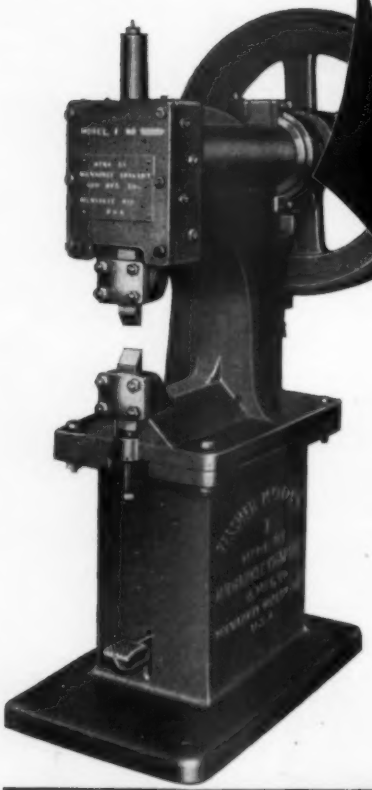
After molds are made, they are placed on a series of 12 gravity-roll conveyors and poured from hand ladles. Sand is delivered to the molding machines by an overhead conveyor and returned from the shakeout to the conditioning equipment by underground conveyor. From the shakeout, castings are transported to the cleaning room by truck.

A principal advantage of induction furnaces is that they melt a variety of compositions without contamination of unwanted elements. The easily accessible crucible-shaped linings are easily poured free of molten metal, or changed quickly as required for melting steel of a different type. This means of melting is particularly suitable for stainless steels which are required to have low carbon content for best serviceability—fuelless melting avoids the possibility of carbon pickup.

Furthermore, the high pouring temperature necessary for small molds is attained easily and maintained by regulating current input to the furnace during pouring off. This permits pouring small molds at practically uniform high temperature. Another notable characteristic of induction melting is the ease with which heats can be duplicated, because composition can be controlled accurately. In mass production of castings, it is important to have easy duplication of any desired analysis.

Now—we're building it

TESSMER sprue cutter



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The acquisition and manufacture of the Tessmer Sprue Cutter by the Milwaukee Chaplet and Manufacturing Company links together two names well known to the foundry industry—We pledge ourselves to strict adherence to the efficient design and rugged trouble-free construction that won the Tessmer Cutter its fine reputation.

Whether it be a new machine—or replacement parts for the veteran in your plant, write or wire

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Gray Iron Casting Shipments Up

Shipments of gray iron castings during the first quarter by 1200 foundries, representing about 92 per cent of the industry capacity, totaled 2,358,440 tons, according to WPB. This compares with 2,339,800 tons shipped in the fourth quarter of 1943 by more than 2000 foundries, representing about 93 per cent of the industry capacity, and with 2,201,455 in the first quarter of last year.

Comparative figures follow:

Shipments (Net Tons)	1943	1944
Jan.	721,560	765,433
Feb.	683,277	764,369
March	796,618	828,648
1st Quarter	**2,201,455**	**2,358,440**
April	820,339	.....
May	800,266	.....
June	814,158	.....
2nd Quarter	**2,434,763**	.....
July	712,224	.....
Aug.	744,347	.....
Sept.	785,449	.....
3rd Quarter	**2,242,020**	.....
Oct.	786,614	.....
Nov.	760,883	.....
Dec.	792,065	.....
4th Quarter	**2,339,800**	.....
Year	**9,218,038**	.....

Meehanite Metal Corp., New Rochelle, N. Y., has licensed two additional companies to produce meehanite castings in India: Jessops & Co. Ltd., Calcutta, and Binny & Co. Ltd., Madras.

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INCREASE PRODUCTION

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TAM Foundry Zirconite Sand does not warp, requires minimum venting and the faster chilling permits better metal distribution into heavy sections and reduces "hot tears"! Four important factors.

TAM Foundry Zirconite Sand is available in three grades, Zirconite Sand A has an approximate melting point of 3812° F. Zirconite Sands B and C 3650° F.

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ALLOY MANUFACTURING COMPANY

TAM Foundry Zirconite Sand "A" was used in the core for the chrome steel impeller wheel illustrated. Note the clean, smooth surfaces.

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IT CAN BE CAST CENTRIFUGALLY

(*Continued from page* 84)

extraordinary control of temperature and metal handling).

However, with good judgment and experience, most of the alloys can be handled satisfactorily. In fact, metals lacking in ductility or malleability which cannot be extruded or rolled, may successfully be cast centrifugally. Among these are high-antimony, high-bismuth and high-tin alloys.

Due to centrifugal force, combinations of metals may be realized. In some instances a composite of gray iron and brass has been made, and, in the ferrous field, a high-chrome steel ring is cast with a lower grade backing. With progressive design improvement of placing wear-resisting material where its quality is required, extensive developments are anticipated.

Suitability as to size and shape is another consideration in centrifugal casting. Size as a single consideration is determined principally by the speed-range, strength and construction of the mechanical equipment available. Parts weighing from several ounces to several tons have been cast successfully and economically.

In considering the economy of the process we also set a bottom limit in size. At present in centrifugal casting, excepting the more recent development of small parts, difficulties still are experienced where "cast to size" or "no machining" are specified, particularly on plate castings of thin sections and very large diameter. It is not practical to make an ordinary plate or a simple cover by casting it centrifugally, simply for appearance sake, because unless exacting conditions are maintained, a good appearance will not result.

Shape is a factor of prime importance. Though its definition may vary considerably, it should contain certain basic features for the most desirable usage. Continuity of adjacent parts is the basic element. Centrifugal force lessens the difficulty of filling heavy sections through a thin wall.

Close Balance Necessary

Symmetry is necessary because of the excessive stresses produced when an unbalanced load is swung about the machine axis. The stress is proportional to the load and the square of the speed. Preferably, the casting should be diametrically balanced about the axis of rotation, or should some irregularities become evident a weight is used to counterbalance this effect as shown in Fig. 1.

Non-cylindrical or slotted bores in uncored openings have not, as yet, been successful in centrifugal castings. These are represented in Fig. 2.

Pressures developed in the mold extremities by centrifugal force prescribe some limitations as to true or cylindrical bores. For example, imagine casting a single propeller blade with its hub. A certain speed would be calculated for the bore to avoid the parabola formation; then the force on the end of the blade would go beyond the limits of the machine, as indicated in Fig. 3.

Minimum size of the spun holes is another important feature. Bores below 1 inch, cast individually, have not been very practical. Excessive losses are realized in the handling of the metal, through spillage (in the flush-out method where excess metal is emitted through the cover for cast size and is nearly completely oxidized), or, in the length of time the metal is held in the furnace. A probable solution to this problem is to spin the castings solid. If practical, several pieces should be placed about the axis of rotation with a central gate. Where quality and its linking features are unnecessary, it may be better to cast these small jobs statically.

Ring blanks having heavy cross-sectional area tend to shrink in the center of the inside bore. This is particularly true on individual pieces of large diameter with small heights. In order to overcome this natural shrinkage, it becomes necessary to add large amounts of stock

(*Continued on page* 192)

Sure, we're busy—
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During this war emergency those whom we serve have more fully realized how important has been our long established policy of doing the utmost to render good service. They know we may be relied upon even during these war busy days.

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Just in case you've eased up... ON YOUR PAY ROLL PLAN

Pause one brief moment. Compare your lot—and that of the men and women in your employ—with the lot of the infantrymen who meet the enemy face to face, who do the hardest fighting, who suffer the most casualties.

Let the full impact of war's unending grimness swiftly convert any tendency toward complacency into revitalized urgency. Remember—the war is not yet won.

As top management and labor, you've been entrusted with two major responsibilities—steadily maintained production, and steadily maintained War Bond Sales *through your Pay Roll Savings Plan.*

Decide *now* to revitalize your plant's Pay Roll Plan. Have your Bond Committee recheck all employee lists for percentages of participation and individual deductions. Have Team Captains personally contact each old *and new* employee. Raise all percentage figures wherever possible.

Don't underestimate the importance of this task. This marginal group represents *a potential sales increase of 25% to 30% on all Pay Roll Plans!*

Your success will be twofold: A new high in War Bond Sales; and a new high in production. Because a worker with a systematic savings plan has his mind on his work—not on post-war financial worries. He's taking care of the future now. His own. And his Country's future. *Help him!* REVITALIZE YOUR WAR BOND PAY ROLL SAVINGS PLAN.

Official U. S. Coast Guard Photo: The elevator to a Coast Guard-operated transport hospital

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SELL MORE THAN BEFORE!

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(*Continued from page* 190)
in the bore to insure a sound, clean casting, as shown in Fig. 4. An alternative is to use a controlled pouring rate, first pouring rapidly and then tapering off.

Castings with a vertical bore and outlying details at right angles have definite limitations in the nonferrous fields because of dross entrapment (Fig. 5). This difficulty of trapping in corner sections is minimized in steel castings where the metal is not so readily disturbed by oxygen. A possible procedure for overcoming this defect is to inject neutral gases inside the mold previous to the introduction of the live metal.

The shrinkage of metals from the mold wall aids the extraction of castings and the repetition of the casting process. After one casting is spun it is but a matter of seconds before the mold can be adjusted and prepared for the next casting.

Still other restrictions are noticed in the use of cores. Hard surfaces, higher tensile strengths and high dry strengths are required for the outside or cover cores. Here again at reduced speeds green sand is coming into its own. Some difficulty exists in anchoring the core in a permanent or semi-permanent mold. Cores, colloquially termed, "splash cores," have proved successful.

Where cored openings are necessary as reliefs in permanent mold equipment, or to gain inside contours, collapsible center cores must be used due to the contraction. This is necessary, in casting a pulley for example, where the outside rim may be level or higher than the hub. The metal casting will crack (Fig. 6) if it is not able to collapse the materials between its constricting areas. Special care also must be taken in tying these cores.

Where it is necessary to insert pin cores in the area of the surface for bored holes (Fig. 7) it is preferable to use the *centrifuged* method or static casting. If the metal is poured too rapidly while the mold is rotating, the metal washing these pin cores invariably will wash the core away or show flow lines detrimental to the casting.

Another limitation characteristic of centrifugal casting is the requirement that the cored or cast hole must be near the axis of rotation to insure progressive shrinkage and proper feeding by use of centrifugal force.

Previously, machine design has been characterized by heavy construction. This was necessary because of failure to obtain maximum physical properties in casting. Generally, the process of streamlining equipment and making it more compact has increased the demands for an improved smaller type casting—one which occupies a minimum of space with a maximum efficiency. Where metal density and compactness of size are required qualities, centrifugal casting may be the only solution for some engineering problems and the comparative costs may not be a factor.

Castings Made in Wide Variety

Parts that have been cast successfully are legion. In gray iron they include a variety of gear blanks, pulleys, stick castings, sleeves and bushings. In nonferrous metals, blanks and bushings of all sorts, squares, hexagon and octagon shapes, and many types of sleeves capable of withstanding hydraulic pressures as high as 3000 pounds per square inch, have been cast. Fig. 10 shows some of the variety among the smaller types; much larger types have been made.

In steel: Cluster gears, gear blanks, valve bodies, inside flanges, airplane landing gear parts and axles are common castings. Steel lends itself more readily to *centrifuged* castings than do the nonferrous alloys because of the easy removal of the gates with a cutting torch.

Due to its directional qualities, centrifugal casting challenges forgings in some fields. The resultant castings are uniform, closer to size, compare favorably in density with a high percentage of yield in the casting and machining operations. In many instances the casting has only a boring or threading operation and can then be immediately applied to the job; whereas in comparative instances of free forgings the latter may have to be trued, then milled, turned, bored and threaded. Frequently such forgings require more expensive equipment, more machining and more highly

(*Concluded on page* 194)

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Technical Methods

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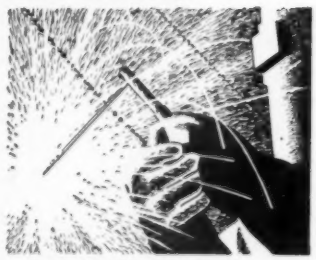
At last, a development that automatically starts the arc before the welding electrode actually comes in contact with the work! Eliminating the "pecking" or "scratching" that so often creates tension and operator fatigue. Its many advantages contribute largely to saving time and labor because an operator can be trained in far less time than usual, and higher speeds can be obtained. This hy-cycle automatic arc unit, called "Missing Link," permits the operator to weld with any welding rod, bare steel or alloy. Rods that could not be used before can be burned with ease—such as bare mild steel, dust coated, reverse polarity, aluminum, bronze, stainless steel, etc., AC or DC.

One of its most important advantages is welding light gauge. Light gauge requires low heat—making many jobs almost impossible for ordinary methods. Since the "Missing Link" starts automatically on as low as one ampere of heat, the welding of light gauge sheet can be done with surprising speed with no time out for "pecking" and "sticking."



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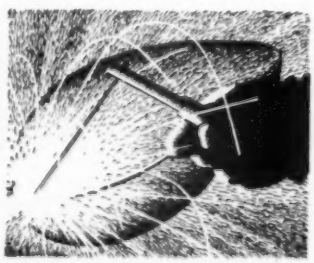
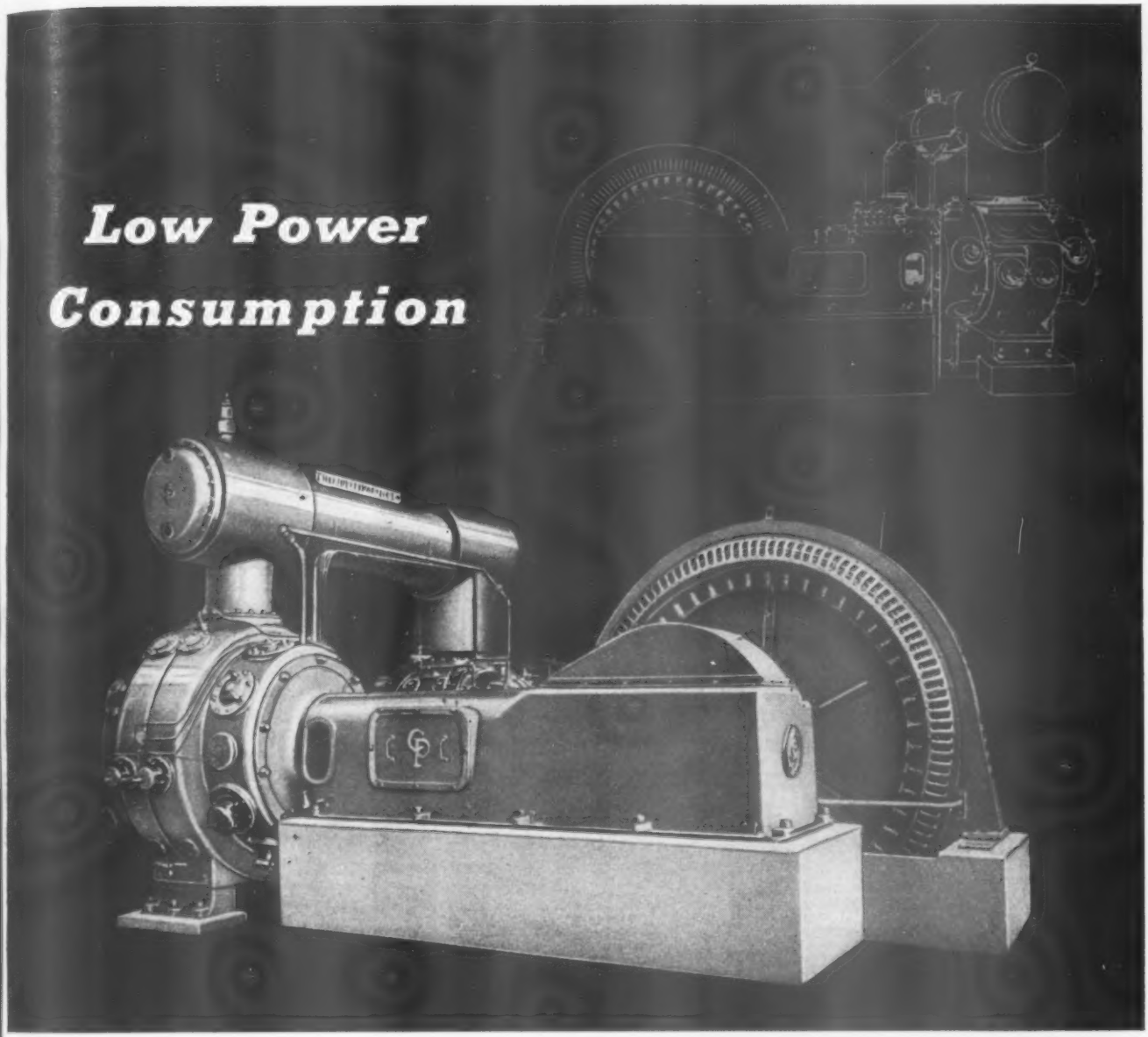


Makes it easy to weld light gauge work

You all know that our fighting men need the finest quality materials that we here at home can produce. That goes for Wrigley's Spearmint Gum, too. Although our stock pile of quality raw materials is getting lower and lower we are maintaining our standards of quality. Naturally, we are forced to limit production. So we are giving priority where it is needed most—and where you want us to—our fighting men and women overseas only. Because chewing gum is essential to them—they are getting all of our limited production of Wrigley's Spearmint Gum.

You can get complete information from Mid-States Equipment Company, 2429 S. Michigan Ave., Chicago 16, Ill.

Y-133



BUILT INTO CP CLASS O-CE COMPRESSOR

THE low power consumption of the heavy-duty Chicago Pneumatic Class O-CE Compressor is the result of large area, durable, quick-acting Simplate valves . . . streamlined air passages . . . multi-step capacity regulation . . . thoroughly effective intercooling and water jacketing and efficient lubrication.

CP Class O-CE Compressor is of the horizontal, double-acting, water-cooled type with direct-mounted synchronous motor drive. Capacities range from 350 c.f.m. to 10,000 c.f.m., 80 pounds to 125 pounds pressure. Other sizes available for lower and higher pressures and for other types of drive. Write for Bulletin 726.

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AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

(*Concluded from page 192*)

trained mechanics. Fig. 8 shows a centrifugal casting as cast and the same part machined ready for application.

Price is a much debated question. Static casting with its gang molds offers competition in certain types of small, individual pieces or jobbing lots. Often arising is this question: Is it more economical to spin 12 individual pieces with no further operations necessary before machining, or is it cheaper to make 12 in a single flask, considering the cost of such additional operations as cutting off gates, handling the sand, as well as extra equipment repair and other necessary overhead? It is understood, of course, that no special physical characteristics of high tensile strength or density are required.

The cost of molds or mold material is not much different than the cost of good sand pattern equipment. The use of permanent and semi-permanent molds for bushings minimizes cleaning costs, eliminates the center core and reduces extra metal handling. Centrifugal casting, due to its higher yield and lower scrap percentage, proves more favorable in the nonferrous field because there is a comparatively lower overhead through lack of risers and accompanying costs. A higher yield results, not because of personnel but because of better metal pressure and control through feeding that cannot be accomplished in static casting.

Another consideration can be recognized in the machining costs. A centrifugal casting, if it is to be scrapped at all, would be found defective in the first machining or roughing operations; gas holes or spongy structures are readily noticed. On the other hand, this does not hold true for a static casting, where inherent defects may still exist.

For example, in static casting a heavy bushing, a shrink or gas hole may be confined some place within the wall and not be uncovered in the machining. This job may be sent into the field for use and placed under pressure, with a resultant leakage. But after the final machining of a centrifugal casting, the part may be sent out on the job with a good assurance of its soundness and performance.

A comparative cost can be seen with the layout of all the predominant managerial factors arranged as in a balance sheet. In comparison we find only a small space necessary for centrifugal casting, with a large building for static or sand casting; less skilled and highly trained personnel is needed; for centrifugal casting somewhat more equipment is necessary but the higher initial cost is compensated by the higher yield, with a variable metal loss through oxidation and holding in a furnace that favors the larger centrifugal casting; production per man is reasonably higher than that of static casting.

Altogether, however, the initial cost of centrifugal casting may be higher on complicated jobs which may require cores or special mold equipment. The finished cost usually will be similar to or less than a static casting. Therefore, centrifugal casting should be considered even in the less obvious cases. With these principles in mind, it can be concluded that a centrifugal casting is desirable because of the following advantages:

1. High quality of the casting.
2. Greater yield.
3. Savings in machining costs.
4. Limited equipment needed.
5. Maximum production with limited space.

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The CARMAN WAGE INCENTIVE SYSTEM is based upon our Foundry Point System for determining the standards for computing the incentive earning of the productive worker and non-productive worker.

Key men and foremen are included if desired.

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We serve only the foundries, both the largest and the smallest

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Our Clients are Already Preparing for Post-War Conversion, Including Finances During the "Change-Over" Time.

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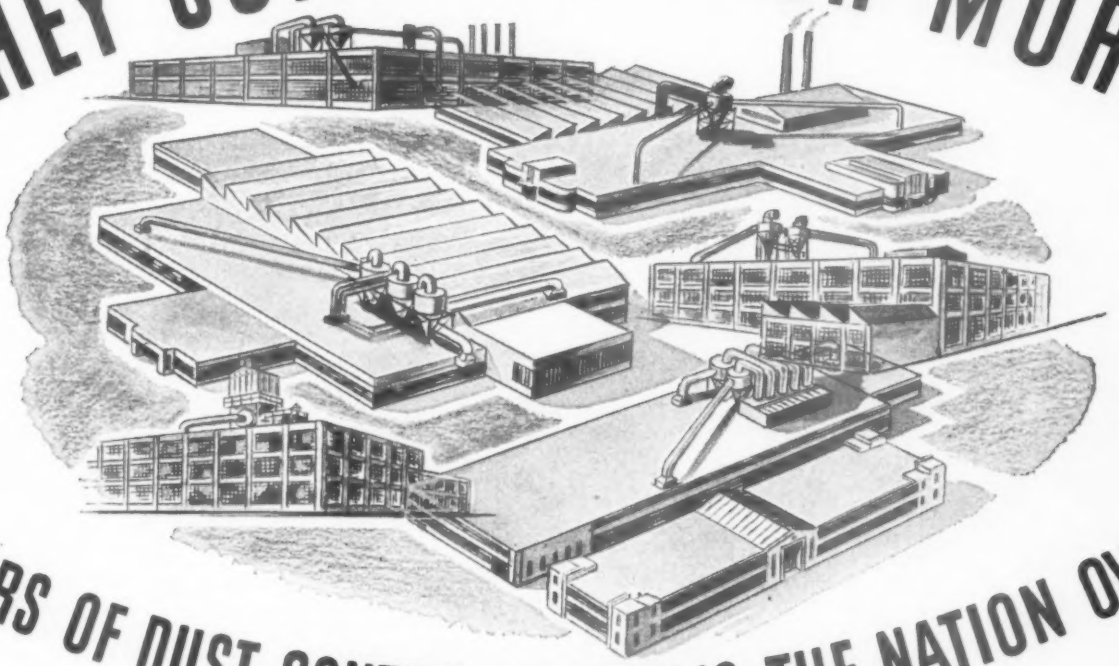
Copper & Brass Group Elects Officers

Robert L. Coe, vice president of Chase Brass & Copper Co. Inc., Waterbury, Conn., was re-elected president of the Copper & Brass Research Association at its twenty-fourth annual meeting held at New York, May 25. Vice presidents elected are: Wylie Brown, Phelps Dodge Copper Products Corp.; William M. Goss, Scovill Mfg. Co; Curtis L. Smith, National Copper & Smelting Co.; Herman W. Steinkraus, Bridgeport Brass Co. Other officers include: Treasurer, C. Donald Dallas, Revere Copper & Brass Inc.; manager, T. E. Veltfort; secretary, B. B. Caddle.

THEY COME BACK FOR MORE



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Cincinnati Milling Machine Co.
Estate Stove Co.
Ford Motor Co.
General Electric Corp.
General Motors Corp.
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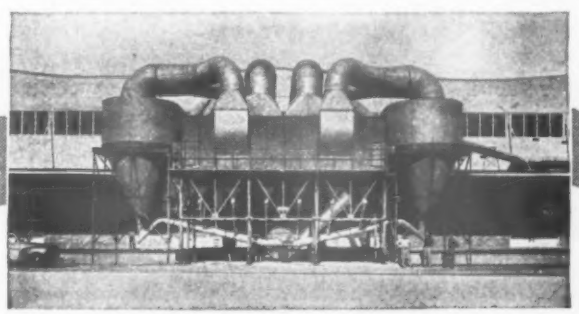

FUNDAMENTALS OF CUPOLA PRACTICE

(*Continued from page* 82)

given several thousand hours of continuous service. Fire clay refractories were used.

Ability to Do Work—The cupola's nominal melting performance is 0.75 tons of metal per square foot of cupola area per hour. Many cupola operations are directed to the production of 1 ton of metal per square foot per hour. Any other type of melting furnace is a very poor second to the cupola on the basis of work done per unit of area per unit of time when converting cold metals to fluid metal at high temperature and of the desired chemistry and cleanliness. It was not uncommon in the automotive industry for a medium size cupola, 72-inch inside diameter, to melt 500 tons of metal in a 16-hour day. Today there are some larger cupolas, lined to 103 inches inside diameter, and if one of these cupolas was operated as the automotive industry has operated its cupolas, it could melt 1500 tons of metal in a 24-hour day.

When one thinks of melting 100, 500 or 1500 tons of metal a day in one cupola, all that is needed to appraise the cupola's ability to do work is to figure out how many furnaces of another type would be needed to do the same job. Ability of the cupola to do work is something like eight or ten times that of other types of furnaces.

Conversion Cost—The cost of converting cold materials into hot metal of the desired chemistry and temperature is less for the cupola than for any other type of melting furnace and usually is of the order of $1.75 to $3.25 per ton of hot metal, being lowest when large tonnages are melted. Comparable conversion costs in other types of melting furnaces range from $5 to $40 per ton of hot metal.

Investment—The capital investment in cupola melting equivalent is low, but when the operations are large enough to justify mechanical charging equipment, or when the cupola air supply is preheated or conditioned to a uniform moisture content, the capital investment can be a very appreciable figure.

Melting Speed—Corollary to the cupola's ability to do work is that it is a high-speed melting process. The time that metal at high temperature is exposed to the influence of hydrogen or other gases is very, very brief in the cupola melting process and is more favorable than the air furnace or electric furnace. Quality of the product made in the cupola partially is dependent on the chemistry of this product, particularly carbon. When we fail to grasp the importance of synchronizing various operating details to the high speed melting operations we fail to produce products of consistent carbon contents, whatever the desired level of carbon may be, and subsequently we fail to produce the higher quality products that can be produced in this type of melting furnace.

Scrap Use—The cupola has an unusual ability to convert the less desirable forms of scrap into usable products. Not long ago I saw a cupola melting several hundred tons a day in which 80 per cent of the charge was loose steel turnings and flashings. Steel turnings alone amounted to 65 per cent of the charge. Cupola pressure at the time was 24 ounces, but it had been higher than 48 ounces. Melting losses of iron, silicon and manganese were no more than average. The roof around the cupola (or any other place) was not covered with these finely divided materials. It is not recommended that foundries utilize large percentages of finely divided materials in their melting operations, but this example does illustrate what can be done as future operations may require.

Not long ago a company producing considerable structural steel scrap in its manufacturing operations had its purchasing department scurrying around the countryside trying to get steel rail for

(*Continued on page* 198)

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ASSURE SOUND CASTINGS
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Cut Costs and Cut Time . . .
Improved heat treating is responsible for the faster cutting and longer life of Capewell hack saw blades. Hence the saving in production time and costs. Prove these advantages with your own tests.
Capewell foundry chill nails are smooth, clean and bright — because they are cold rolled from the finest soft iron. They fuse readily. The Capewell line — the most complete — has the right nail for your job. Send for samples. THE CAPEWELL MFG. CO. Hartford, 2, Conn.
MOLYBDENUM TECHNITE HIGH SPEED
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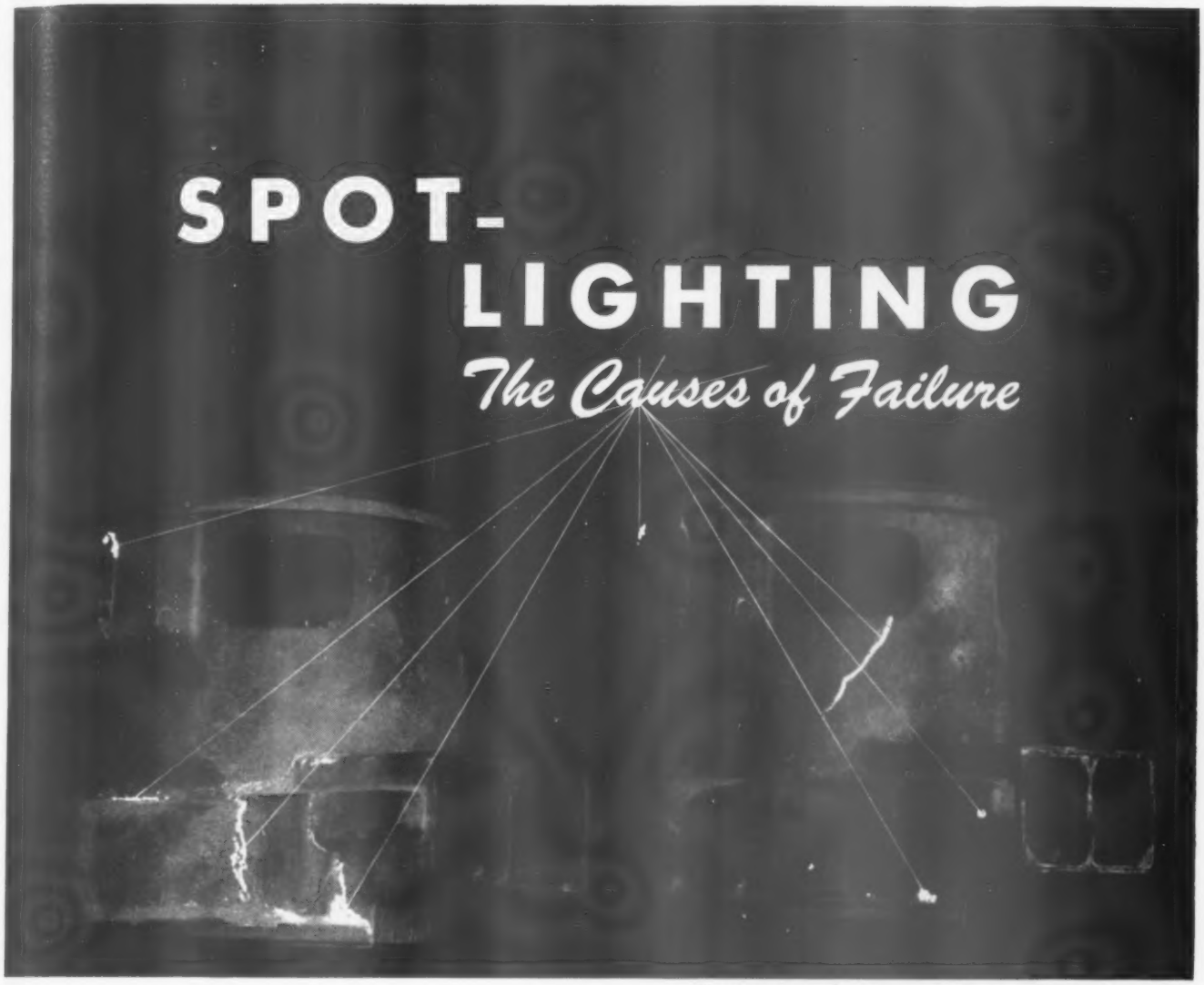

Shrinkage cracks in 2 cast aluminum motor housings.

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"Spot-lighting" such flaws is the actual result of installing the Zyglo Method. Four simple steps are performed rapidly on every part that comes off the production line. The method is non-destructive and all parts passing inspection can be used.

First, Zyglo penetrant carrying fluorescent material is flowed over the part; then after washing, drying, and dusting with developing powder, it is examined under "black light." Illuminated indications are brought out which can be interpreted by the experienced inspector—frequently resulting in correction of the cause.

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(*Continued from page* 196)

the foundry's melting department. This foundry could have utilized every pound of the structural steel scrap the company generated and not only would it have stopped selling one type of steel scrap at a low price while buying another type of steel scrap at a higher price, but the structural steel was a more desirable scrap for the end product.

Essentials of good cupola practice are so elementary that relatively few foundrymen are willing to give them the thought they deserve or to adhere to them rigidly in practice. One of the most important of these essentials is the accurate weighing of all materials going into the cupola to be melted down.

Judging from personal observations at a great many foundries and at some other industries utilizing cupola melting equipment, it is the author's opinion that the simple function of accurate weighing of materials just does not exist. A few years ago I had occasion to help correct a very bad cupola melting practice at a certain foundry, and before attempting to operate the cupola I spent the previous day rehearsing the essentials of good cupola practice with the various men in the organization. This plant had a yard foreman who was responsible for making up the cupola charge. He declared that he would guarantee to weigh materials with an error of no more than 2 per cent, and since it was planned to use 75-pound coke charge, his guarantee meant that each charge would be between 73.5 and 76.5 pounds.

The next day when the cupola was being charged the coke was sent up to the charging floor in cars holding four coke charges, but there seemed to be a tremendous difference in the size of the different charges. Upon questioning the yard foreman he insisted on the accuracy of the weights of the supposedly 75-pound charges. Finally in desperation I took all four coke charges from one car, put each charge in a separate burlap sack, found another scale, and weighed the fuel. Not one of the four charges weighed as much as 75 pounds and some were as light as 37 pounds.

Weights May Vary

This is not intended to give the impression that all charging scales are not dependable, for actually they may be brand-new scales of the best type that money can buy. However, the technique employed in weighing on a very fine scale may be just as important as avoiding use of an inaccurate scale. For example, if we wish to weigh 100 pounds of coke we might place the coke directly on a scale platform and if the scale is in reasonably good order and of low enough capacity, we would have little doubt about the 100-pound weight of coke. In this case everything, or 100 per cent of the scale load, is "live load". But usually we do not weigh coke directly on a scale platform, a common method being to put the coke in a wheelbarrow and weigh both coke and wheelbarrow. Let us assume that the wheelbarrow weighs 100 pounds and we want 100 pounds of coke. The total weight on the scale platform is 200 pounds but the live load is only 50 per cent of the load actually weighed. Let us assume further that we do not weigh the wheelbarrow after each weighing and also that the dead weight of the wheelbarrow is accounted for by a counterweight on the scale. Even this reasonably satisfactory method develops inaccuracies if we have five or six wheelbarrows whose weights range from 90 to 110 pounds and we average them all at 100 pounds. In this case the live scale load of coke intended to be 100 pounds may be as much as 110 pounds or as little as 90 pounds.

Next suppose we have an industrial car or charging bucket which weighs 1000 pounds and we want to weigh 100 pounds of coke. The total weight on the scale is 1100 pounds but only 9 per cent of this load is the live load. Now suppose we have a number of industrial cars or buckets. Can we assume each one actually weighs 1000 pounds? Might not they too range in weight from, say, 900 pounds to 1100 pounds each? Then we might have still another condition where the dead load on the scale mechanism is of the order of 10,000 pounds and if we still want to

(*Concluded on page* 200)

GOOSE LAKE

Fire Clay and
Fire Clay Flour
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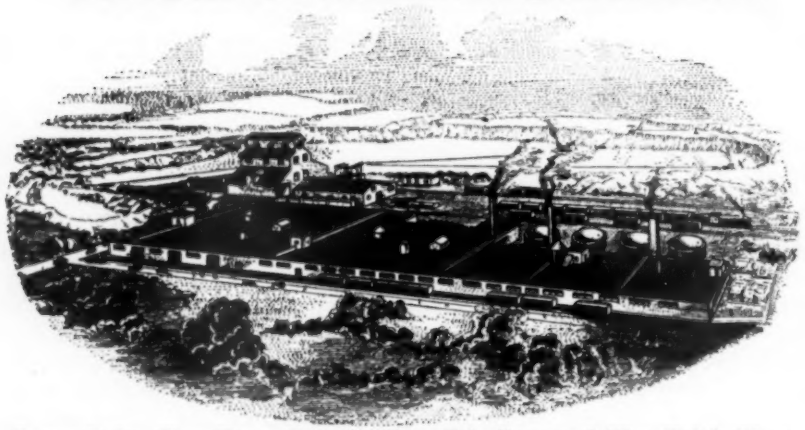

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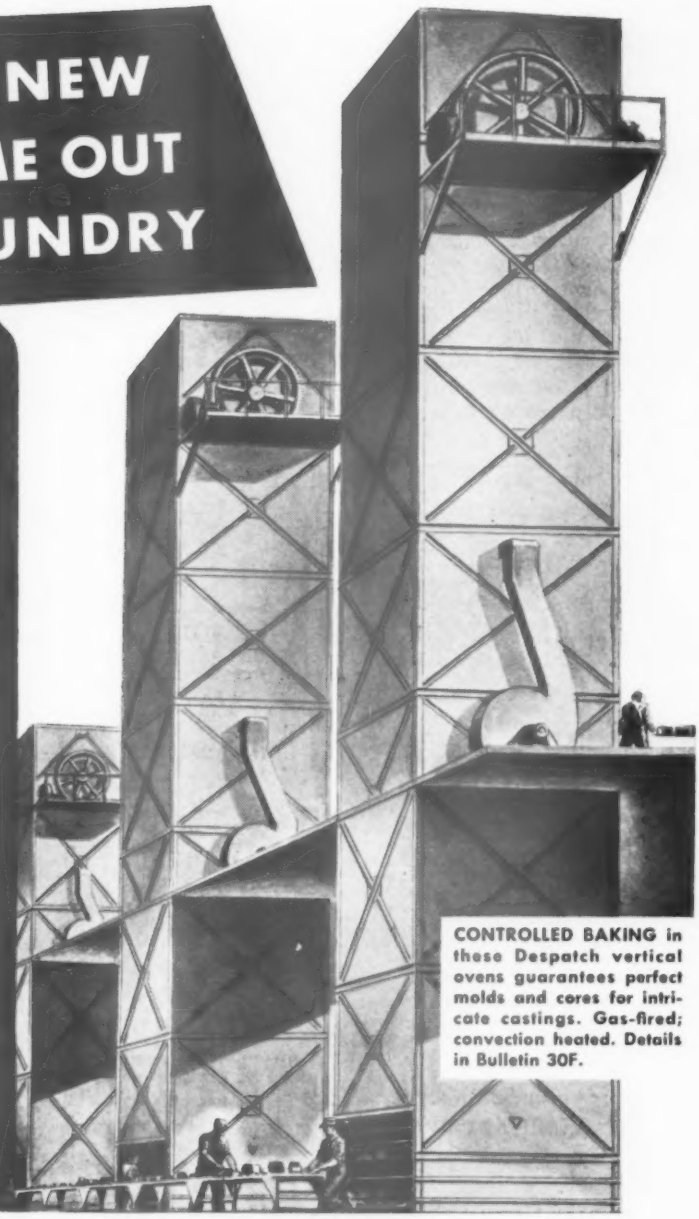
Despatch can help you get your share of this new casting business by providing the *better* core baking ovens such work is *known* to require.

ASK FOR FREE BULLETINS describing *new* Despatch foundry ovens. Fully illustrated; just off the press!



CONTROLLED BAKING in these Despatch vertical ovens guarantees perfect molds and cores for intricate castings. Gas-fired; convection heated. Details in Bulletin 30F.

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To produce intricate castings profitably, foundrymen have discovered that *all* variables must be closely controlled. This has been proved. That's why Despatch ovens, engineered to provide *exceptional control of all factors in baking*, guarantee the right cores and molds for all new type castings.

BAKES CORES UNIFORMLY. Close-tolerance dimensions are maintained by uniform, accurately-controlled heatflow. . . . Gives identical bake throughout chamber; assures smooth, accurate castings; avoids rejects.

SPEEDS UP PRODUCTION. High volume forced convection system provides rapid baking, boosts daily output. Automatic control maintains exact heat desired. No over-baking or under-baking of any core or mold in the entire load.

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CUTS YOUR CASTING COSTS. Elimination of baking rejects, baking-to-specifications performance, and effective use of fuel, space and manpower help assure *better* castings at less cost.

LET DESPATCH ENGINEERS HELP you with your present or postwar plans for more *profitable* business. You'll save both time and expense. Write today!

3 NEW BULLETINS SHOW HOW DESPATCH OVENS BOOST FOUNDRY PRODUCTION

DESPATCH OVEN COMPANY MINNEAPOLIS

(*Concluded from page* 198)

weigh our little 100 pounds of coke, the total weight amounts to 10,100 pounds of which the live load amounts to only 1 per cent.

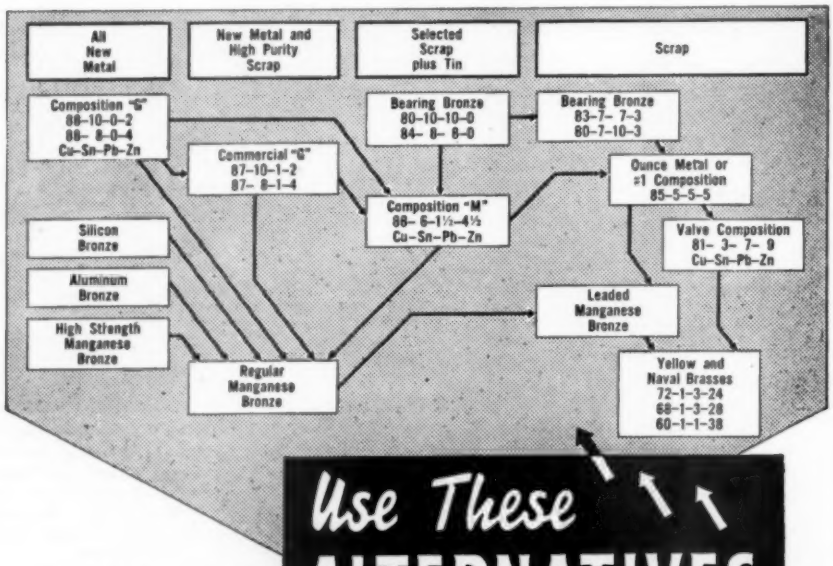
One foundry experiencing trouble with cupola operations and quality of its product—a foundry melting 300 tons a day—was using an industrial truck on the cupola charging platform to handle all raw materials going into the cupola. One component of the charge was placed on a tray that weighed 1200 pounds and this tray was picked up by the industrial truck weighing 6700 pounds, and all three—component of iron charge, tray and truck—went onto the scale platform. One component of the iron charge weighed 500 pounds, so when this was weighed the total weight on the scale was 8400 pounds and the live load was only 6 per cent of this total.

No matter how ridiculous these conditions may seem they have been observed in hundreds of foundries. It is not difficult to weigh 1000 or 2000 pounds of pig iron, but it is an entirely different matter to weigh 25 pounds of silvery pig iron or 75 pounds of coke or 12 pounds of ferromanganese. In modern good cupola practice most fuel charges and many components of the iron charge are small and they are not easy to weigh accurately with the facilities commonly employed for the work.

The following incident illustrates the correct attitude that should be taken toward the weighing of raw materials. A friend of mine was observing the weighing operations at a foundry using a 48-inch diameter cupola to melt up to 150 tons a day using a 67-pound coke charge. The melting foreman passed by and remarked, "that's gold we're weighing." That is the simple story on weighing, and if the foundryman weighed his cupola charge materials as though they were gold a great many of his problems would vanish.

The cupola is not capable of delivering what is desired if it must receive whatever and anything that happens to be charged into it, but it has the capacity to deliver what is wanted if the proper ingredients are charged in the correct amount.

(*To be concluded*)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New Metal and High Purity Scrap
Selected Scrap plus Tin
Scrap
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Commercial "G" 87-10-1-2 87- 8-1-4
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Ajax Nickel-Copper 50-50%
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Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Notice how the arrows on the W.P.B. chart point to the *right*. . . . They show how alternative materials *currently available* can be utilized by foundrymen as now permitted by many designers. The purpose is to conserve primary metal at the mine through increased use of secondary ingots. Sometimes great ingenuity is called for, yet remember this:

The first program for scientific control of ingot metal was set up by Ajax 45 years ago. The result has been metal and practical technical follow-through in which Ajax increases your production by reducing rejects.

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Book Review

An Engineering Approach to the Selection, Evaluation and Specification of Metallic Materials, by H. W. Gillett, paper, 140 pages, 5½ x 8½ inches, published by the Penton Publishing Co., Cleveland. Price $1.

Prepared for the War Metallurgy Committee of the National Academy of Sciences, and the National Research Council advisory to the National Defense Research Committee of the Office of Scientific Research and Development, and the War Production Board, this volume should be studied carefully by every foundryman, engineer and designer. It is a forthright discussion on the interpretation of test data in the evaluation of metallic materials which undoubtedly will prove enlightening to many since it points out that in many cases tests which are supposed to provide information on certain properties do not have any relationship. A part of the discussion has appeared previously in THE FOUNDRY.

The book contains ten chapters, an extensive bibliography, and an appendix of reference books. First chapter discusses need for interpretation of test data, and the second points out that chemical composition is an insufficient criterion. Chapters III, IV and V deal with "pounds per square inch," meanings of conventional tests, and reliability and probability. Special tests, ability to be processed, and specifications are discussed in Chapters VI, VII, and VIII while Chapters IX and X are concerned with applicable tests and needed tests, and selection.

Fire-Fighting Rules

A new handbook graphically explains the latest techniques in fighting fires with carbon dioxide has been published by Randolph Laboratories Inc., 8 East Kinzie Street, Chicago. It explains the proper arrangement and distribution of extinguishers, and organization of the plant fire-fighting system.

DESIGN, MASS OF QUENCHED STEEL CASTINGS

(*Continued from page* 89)

this section. The same analysis and quenching facilities may then be employed for the satisfactory treatment of the thinner sections and thus meet all the requirements of the first two factors: (1) sufficient hardenability for the sections involved and (2) quenching bath of sufficient capacity and rate of flow. It is possible, therefore, to pour pieces of different section thicknesses from the same heat and quench them with the same equipment in such a manner that the microstructure of all the pieces is predominantly martensitic.

However, the third requirement of a successful quench is not so easily disposed of; in order to avoid quench cracking it is necessary that the parts be removed from the quenching medium before the castings have cooled to a temperature below about 250 degrees Fahr.

Fig. 1 graphically illustrates the cooling rates at the center of sections of various thicknesses; it can be seen that it is impossible to quench light and heavy sections of the same analysis together without cracking the lighter sections or "slack quenching" the heavier parts.

Section Thickness Important

Fig. 1 clearly shows a quite apparent but often overlooked fact. It is impossible to quench together successfully castings of widely varying section thicknesses. A practical solution of the problem is individual quenching with a specified length of time in the water for each section size. Reference to Fig. 1 shows that in order to avoid cracking the fully quenched 1-inch section must be removed from the water in about 2 minutes after immersion, whereas in this same space of time the 4-inch section is still at a temperature of 1350 degrees Fahr. Where individual quenching is practiced, each casting may be handled through the quench in accordance with the full quenching of each piece without the risk of quench cracking.

It is, of course, possible to batch quench castings of different sections provided they are so handled that only castings of the same thickness are quenched together. Successful batch quenching requires good supervision and close attention to detail. It is imperative that the number and spacing of the castings in the load be a constant; furthermore, the relationship between quench tank capacity, rate of water flow and tonnage of castings quenched at one time must be a constant in order to obtain consistent quality. It is the amount of water that comes into contact with the castings, and not the total amount in the tank, that determines the severity of the quench. Practice has demonstrated that 3-ton batch loads may be fully quenched when the tank has a capacity of 2000 gallons of water per ton of castings and the water circulates at a rate of 1000 gallons per minute per ton.

It should be stated that the term "mass" is used here in the sense of thickness only. It is the thickness of a given section which affects all the requisites of a successful quench and not the weight of the part. For instance, the 1 x 8 x 10-inch section heretofore referred to might be increased to 1 x 8 x 40 inches without the necessity of increasing the alloy additions necessary to ensure full hardening, even though the weight of the 1-inch specimen would then be equal to that of the 4-inch piece.

It would seem from the foregoing that the water quenching of steel castings is practicable only when the design is such that all sections approach uniformity. It has been stated that it is impossible to quench fully sections of varying thickness together without cracking the lighter pieces. In the light of these facts it is difficult to see how it is possible to water quench properly any commercial casting involving changes in section thickness within the part. However, it must be remembered that the data thus far presented apply only to sections which are not connected and therefore the influence of one section size upon the cooling rate of the other is entirely lacking.

It is convenient, for the purpose of

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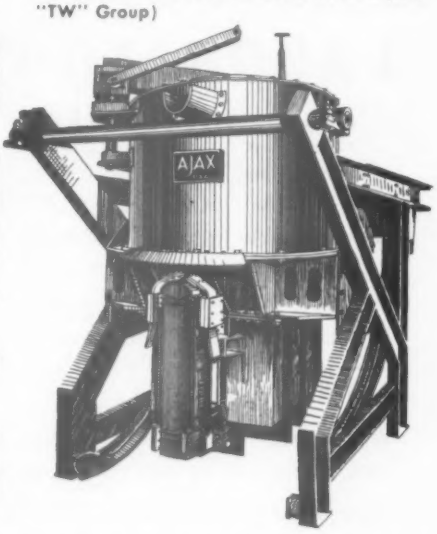

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THE AJAX TAMA-WYATT INDUCTION MELTING FURNACE

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discussion, to deal with the effects of mass and design separately in order to illustrate fundamental principles; actually, the two are interdependent since a cast part is simply the result of the designer's joining and distribution of mass. The most serious difficulties encountered in the water quenching of steel castings arise as a result of objectionable design features. It is not mass itself which causes difficulty, but rather the manner in which the designer joins sections of varying thickness, that causes most of the trouble.

Unfortunately, for the purpose of this discussion, most of the water quenching of castings is being done in connection with government work of a confidential or restricted nature, and it is impossible to depict actual designs. Further, there has been very little time available to gather fundamental data relating to the retarding effect of heavier sections on the cooling rate of lighter connected sections. Much of this work is in progress but not yet available. However, there are certain well established facts relative to the effect of design on the practicability of fully quenching steel castings.

It was pointed out earlier that rectangular blocks of the same length and width, but with thicknesses of 1 inch and 4 inches, respectively, cannot be successfully quenched together; it is clearly demonstrated in Fig. 1 that under these conditions it is impossible to quench fully the 4-inch section without cracking the lighter piece. However, steel castings with sections varying from 5 inches to 1 inch are being water quenched successfully in large tonnages; such castings have microstructures which are predominantly martensitic after quenching and are free from cracks. There are numerous other examples of castings involving extreme changes in section which are being handled satisfactorily through the quench; among such examples are cast parts weighing 85,000 pounds with sections changing from 6 inches to 3 inches, and castings of a few pounds in weight with sections varying from 2 inches to ½ inch.

There are several significant facts which must be noted in connection with the examples given. The designs of the castings are such that the transition from one section to another is accomplished gradually; there are no sharp corners or sudden discontinuities of section. Further, the heavier sections occupy the largest area of the castings and the lighter sections are so joined that heat flow from the more massive areas retards the rate of cooling to such a point that the thinnest section does not drop below 250 degrees Fahr. until the rest of the casting has reached a temperature in the neighborhood of 400 degrees or lower.

Should Fillet Corners

Fig. 2 illustrates the rate of cooling of a 2-inch section joined to a ½-inch section. Comparison with Fig. 1 will show the effect of the one-half-inch section in accelerating the cooling rate of the heavier connected piece. The manner of joining the two sections is the poorest possible and is probably never encountered in practice. He is a very poor foundryman indeed who would attempt to cast such a piece without filleting the corners at the intersection of the two sections.

The subject of steel casting designs suitable for water quenching might well fill a small book. Fortunately, for the sanity of the designer and the foundryman, some very definite rules for casting design have already been formulated and set forth in the *Steel Casting Handbook*. It is true that the rules there stated were arrived at as a result of studies on hot-tears and shrinkage defects; however, they are equally satisfactory as rules for the design of castings to be water quenched and they are set forth herewith for that purpose:

An attempt should be made to design all sections in a casting with a uniform thickness. Abrupt changes in section should be avoided. Sharp corners at adjoining sections should be eliminated. Use cast weld construction when design becomes complicated.

There is one more rule which might be added and which applies specifically to castings to be quenched: When the greatest area of a casting consists of a light section that is joined to a section more than twice as thick as the thinnest

(*Concluded on page 204*)

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GLOBE IRON CO.

JACKSON, OHIO

(*Concluded from page* 202)

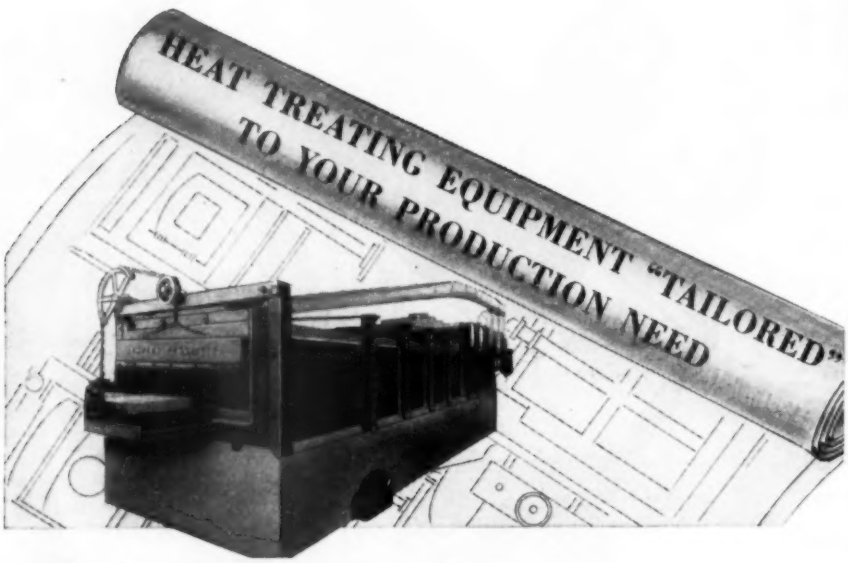
section, the heaviest section should be reduced and formed by the welding, bolting or riveting of other castings thereto.

The effects of mass and design may be summed up as follows:

It is mass, in the sense of thickness, which dictates the choice of analysis. The analysis must confer sufficient hardenability upon the steel to ensure the quenching out of the heaviest section. Mass determines the quench tank capacity and the amount of circulation of water. Mass limits the time that the piece may be allowed to remain in the quenching medium and the production handling through the quench. Design, in the sense of the joining of varying masses, limits the practicability of water quenching in accordance with the means employed to join sections of varying thickness.

It must be added that design has some effect upon the choice of alloys; certain combinations of alloys tend to stabilize austenite to such an extent that the *M* point does not occur until the steel has reached room temperature or below. Such alloy combinations should be avoided since when heavy and light sections are joined in one piece, the thinner sections will have to be quenched to such a low temperature that cracking is certain to result.

It seems appropriate that mention be made of the tempering operations in connection with water quenching. It has been fairly well established that for 1- and 2-inch sections 6 hours at temperature is not an unduly long time for the removal or relief of quenching stresses and the complete tempering of martensite. Heavier sections may profitably be tempered for a period of time at temperature varying from 8 to 12 hours. The results of such treatment after full quenching is a steel with maximum resistance to high rates of stress application. It is most noteworthy that impact values, obtained from fully quenched and tempered steels tested at progressively lower temperatures, may be plotted in the form of a gradual curve. The values decrease as testing temperature drops, but there is no sharp break in the curve down to temperatures of at least minus 100 degrees Fahr.



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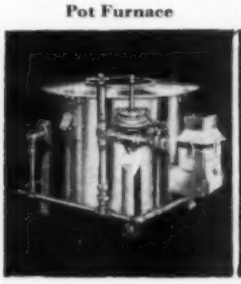
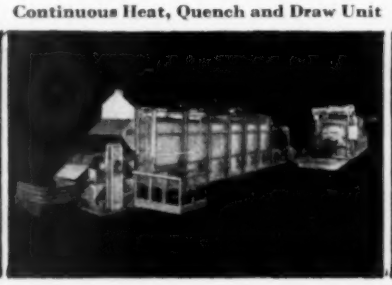
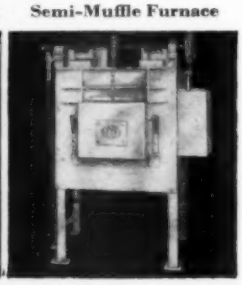
Pot Furnace



Continuous Heat, Quench and Draw Unit



Semi-Muffle Furnace



Nonferrous Foundry Committees Named

Two committees have been established by OPA to replace the single industry advisory committee which previously represented the nonferrous foundry industry. One committee will represent the aluminum and magnesium foundries; the other, the brass and bronze foundries.

Members of the Brass and Bronze Industry Advisory Committee are: Chester K. Faunt, Christensen & Olsen Foundry Co., Chicago; James J. Nelson, Cramp Brass & Iron Foundries Division, Eddystone, Pa. Charles Wegelin, Dixie Bronze Works, Birmingham, Ala.; E. H. Holsworth, Frontier Bronze Corp., Niagara Falls, N. Y.; E. W. Horlebein, Gibson & Kirk Co., Baltimore; William D. Goldsmith, C. A. Goldsmith Co., Newark, N. J.; T. W. Pettus, National Bearing Metals Corp., St. Louis; F. A. Mainzer, Pacific Brass Foundry of San Francisco; William Kelley, Springfield Brass Co., Springfield, O.

Members of the Aluminum and Magnesium Foundries Industry Advisory Committee are: R. J. Roshirt, Bohn Aluminum & Brass Corp., Detroit; Leo Grant, Dow Chemical Co., Midland, Mich.; C. A. Brantingham, Ebaloy Foundries Inc., Rockford, Ill.; P. J. Keuleman, General Bronze Corp., Long Island City, N. Y.; D. W. Moll, Hills-McCanna Co., Chicago; L. E. DeGroat, the Permold Co., Medina, O.; A. G. Harter, Quality Aluminum Casting Co., Waukesha, Wis.; Frank Gaines, So-Cal Foundry, Los Angeles, Calif.; F. H. McCullough, Springfield Bronze & Aluminum Co., Springfield, Mass.; F. S. Wellman, Wellman Bronze and Aluminum Co., Cleveland.

Production of magnesium sand castings in April declined almost 9 per cent from the all-time March peak to 3409 tons, according to WPB. Output of permanent mold castings totaled 206 tons, off 16.7 per cent, while production of die castings rose 7.6 per cent to 92 tons.

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SWING FRAME GRINDER DUST CONTROL

(*Concluded from page 91*)

use has proved feasible for the majority of swing frame grinder operations, and the control of both coarse and fine dust has been very effective.

The booth houses the swing frame grinder which may be mounted on a monorail or jib crane. Casting or billet to be ground is located in front of the booth so it can be readily handled. The front of the booth is enclosed except for an opening of sufficient size to allow necessary movement of the grinder. This opening will vary with the width and height of the work but will normally be from 6 to 9 feet wide and 4 to 6 feet high.

Where occasional high castings are handled, the front plate can be counterweighted to increase the opening height. This detail has been included on two of the booths shown in Fig. 1.

An indraft of 125 to 150 feet per minute is maintained by the exhaust system. This relatively low velocity coupled with the ejector effect of the stream of molten sparks is ample to prevent dispersion of the fine dust. Indraft velocities should be increased for special applications of the swing frame grinder that permits a small opening in the front of the booth. In such cases velocities will range from 200 to 500 feet per minute and the exhaust volume per grinder will seldom be less than 1000 cubic feet per minute. In cases of extreme cross-drafts or convection currents, side shields may be extended to shield the working zone.

With the booth type hood, coarse particles settle out on the floor of the booth and are periodically removed. Fine dust remains in the exhaust air and is conveyed to the dust collector with conveying velocities of 3500 feet per minute. This entrained dust load is still appreciable and will represent from 2 to 5 per cent of the total metal removed. On one installation involving 44 swing frame grinders, the entrained dust carried to the dust collector averages over 1 ton per month. Wear on the exhaust ducts is negligible with the booth type hood, as the heavy particles which represent the major percentage of the weight and which would require high conveying velocities, are settled out on the booth floor.

Chamber Has Advantages

Typical booth construction is shown in Fig. 4. The design illustrated includes a plenum chamber in the back of the booth which has a number of advantages:

1. Adjustable air distribution plates can be regulated to provide uniform distribution over the width of the booth.

2. The plenum can be continuous for a number of booths and greatly simplifies the exhaust piping. A single connection to exhauster and dust collector can be made at any convenient place. This plenum chamber design reduces the cost and space of exhaust system ducts when compared to the conventional method of connecting a separate branch duct from each booth. The air distribution plates can be adjusted to proportion the air between the booths regardless of the location of the exhaust connection.

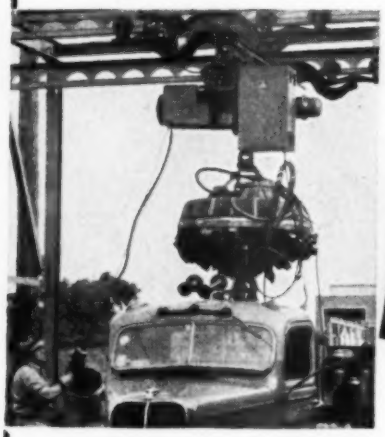
3. In the plenum chamber design no dust accumulation will occur with the design shown in spite of very low velocities. Any such material simply falls back into the booth proper and is manually removed with the remainder of material on the booth floor.

Modification of the booth design for billet grinding is indicated in Fig. 3.

While there may be instances where the booth type enclosure cannot be applied to swing frame grinder dust control, such cases are the exception. For most swing frame grinders, the booth type of exhaust hood offers the same positive control of dust that is recognized and universally accepted as necessary for stand grinders.

Cutler-Hammer Inc. has opened a new "drive-in" warehouse at 1200 Walnut street, Cincinnati. The warehouse and district sales office, Central Parkway and Walnut street, are under the management of E. C. Bolton.

Material Moves Fast With STEARNS Magnets



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Only one of many jobs efficiently and economically done by Stearns Magnets. You may have a similar problem in which we can be of definitely profitable assistance.

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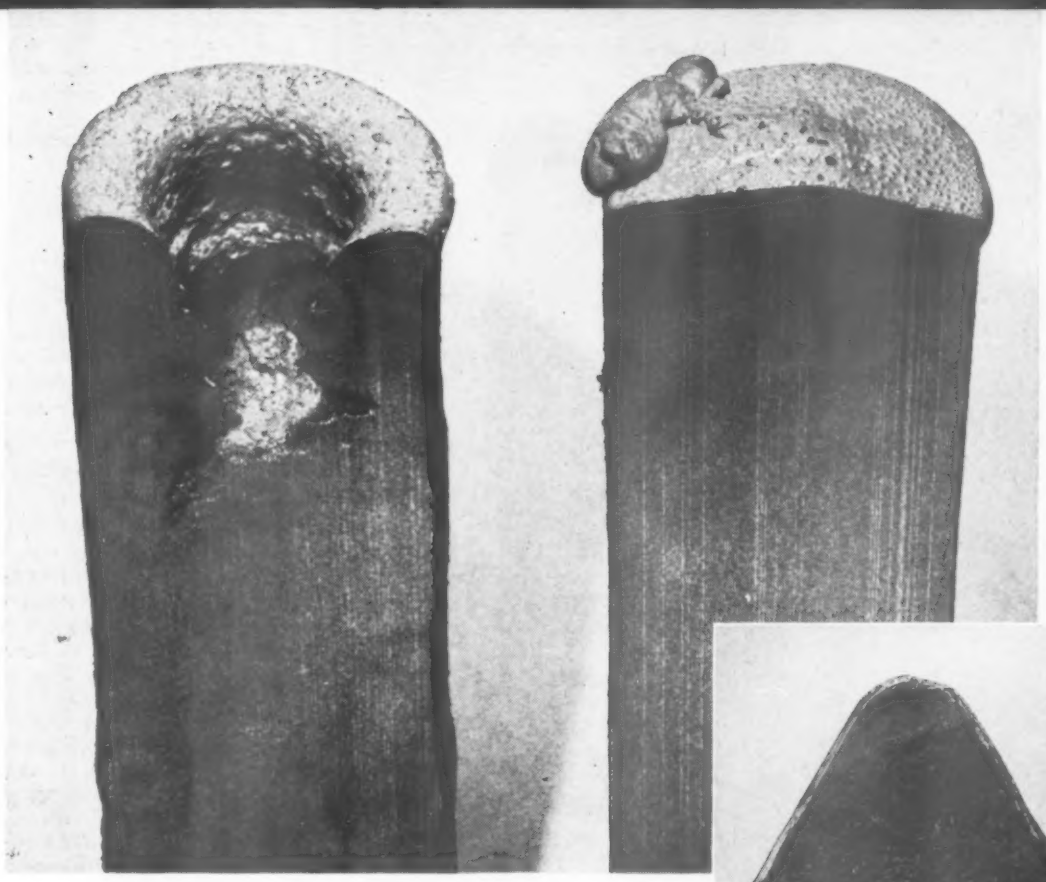
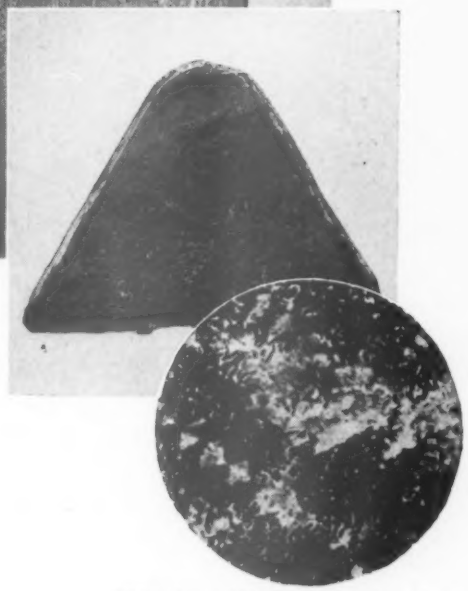


GRAIN REFINEMENT IMPROVES MACHINEABILITY

Here are two risers from the same casting operation. The left is ordinary iron. The right patented G-Iron. See how G-Iron fills the riser completely. Reduction in internal shrinkage makes G-Iron castings sound—grain refinement easier to machine. Gives tools longer life.



*G-Iron is graphitized pig iron. These photographs show its grain structure. *Circle:* Photomicrograph etched—100 diam. Manufactured under U. S. and Canadian patents.

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

DETERMINE SULPHUR IN BRASS, BRONZE

(*Continued from page* 83)

type of refractory and the exit end of the tube is packed with about ½-inch of previously ignited (2200 degrees Fahr.) asbestos. The asbestos is kept from entering the restricted end by a porcelain filter disk placed in the tube before the asbestos is packed. To prevent the metallic oxides that might collect on the asbestos from acting as a catalyst, the tube is adjusted in the furnace so that the asbestos packing is heated to redness.

Delivery tube is made of soft glass with a constricted tip and attached flush with the combustion tube with a short piece of sulphur-free rubber tubing.

A better combustion tube—delivery tube setup would be one in which the connection between the delivery tube and combustion tube is a ground joint of standard taper.

Absorption beaker is a 250 milliliter electrolytic beaker.

Standard sodium hydroxide solution is prepared by dissolving 0.42 grams of sodium hydroxide (ACS) in a liter of boiled distilled water. Four liters of solution are made and allowed to stand for a week, with occasional shaking, before being standardized. It is kept in a pyrex bottle protected by a soda lime tube.

To standardize the solution a 0.5 gram sample of National Bureau of Standards standard sample No. 19c—Steel, A.O.H., 0.040 per cent sulphur is run through the procedure and the sulphuric acid formed is titrated. The titer then is checked by the procedure of Woodward and Wolthorn[4] which uses sodium sulphate as the primary standard. In rapid control work checking of titer can be omitted.

Hydrogen peroxide solution (2 per cent) is prepared from the 30 per cent solution.

The chromium sesquioxide is ignited at 2400 degrees Fahr. in a stream of oxygen until all of the sulphur present is burned out. This is checked by running a blank determination.

The bromcresol green indicator solution is prepared by dissolving 0.1 gram of the dry indicator in 14.3 milliliter of 0.01 normal sodium hydroxide and then diluting to 250 milliliters with water.

Sample should be clean drillings that remain upon a No. 60 but pass through a No. 20 sieve.

Prepare Combustion Boat

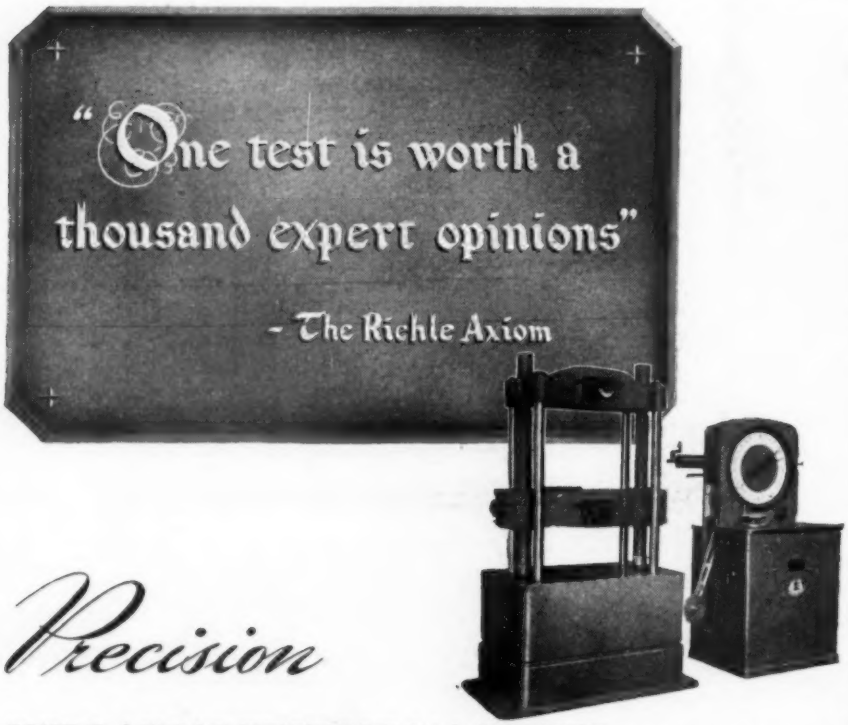
Combustion boats are prepared in the following way. The boat is filled with the ignited chromium sesquioxide and a trough made the full length of the boat to hold the sample. After the sample is transferred to the trough it is covered lightly with a layer of the bedding material. The boat is then ready for the combustion.

Procedure for the sulphur determination is to place 50 milliliters of hydrogen peroxide solution in the absorption beaker, add 3 to 4 drops of bromcresol green indicator solution and adjust the solution to a pH of 5.4 (blue) with the standard sodium hydroxide solution to be used. Allow the oxygen to bubble through the absorber while adjusting this end-point. If the solution is already blue, acidify it with a few drops of 0.01 normal sulphuric acid and then adjust back to alkalinity with the sodium hydoxide solution.

Then weigh out a 0.1 to 1-gram sample of brass or bronze. Transfer the sample to a prepared combustion boat and lightly cover with chromium sesquioxide. Place the boat in the combustion tube, preheating slightly and then push the boat into the hottest part of the tube. Burn the sample at 2100 degrees Fahr. in a stream of oxygen which passes through the tube at the rate of 2 liters per minute. The combustion is usually complete in 5 to 10 minutes.

With the oxygen still passing titrate the sulphuric acid formed with standard sodium hydroxide solution to the end-point using bromcresol green as the indicator. The end-point is observed by looking down into the absorber while titrating the solution. After titrating the

(*Continued on page* 210)



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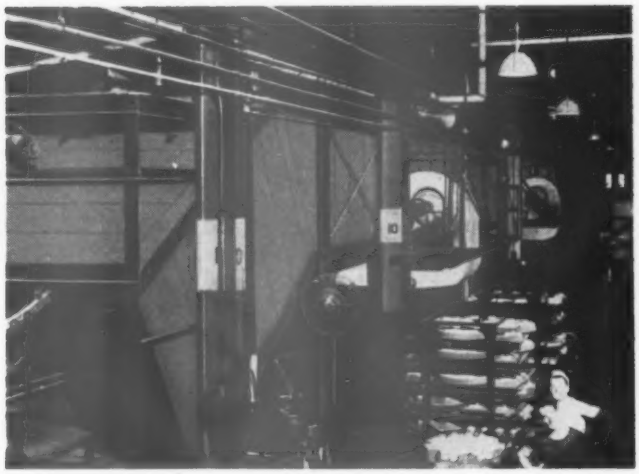

Gehnrich two-pass, monorail conveyor, core pasting oven, 90 ft. long, with gas fired, recirculating air heating a continuous flow of carriers heavily loaded with cores of various sizes in a 75 minute baking and cooling cycle.

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Of firing, heat distribution, temperature, rate of conveyor travel and loading.

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By correct and faster recirculation—convection heating and uniform rate of heat absorption and cooling by all the work, with proper elimination of fumes; assured desired product quality.

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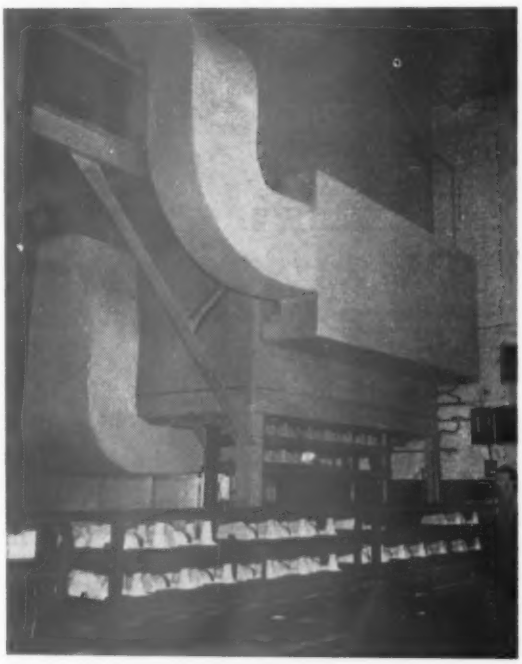
Continuous heating or baking in Gehnrich insulated Dual Panel conveyor ovens saves fuel, time, space, labor, and maintenance; minimizes rejects or breakage; improves working conditions; speeds production.

LET US HELP YOU

Your installation of a Gehnrich gas, oil or electrically heated conveyor oven assures adequate capacity, proper handling and coordination of oven function with attendant operations, exact temperature control and correct, uniform exposure of the product to heating and cooling as it moves through the continuously duplicated processing cycle. That's real production economy!



Gehnrich oil fired, recirculating air heated, tower type core oven, 28 ft. high, in a magnesium foundry, producing over 5000 lbs. of uniformly baked cores per hour in an oven floor space of only 290 sq. ft.

Gehnrich continuous belt conveyor, electric, recirculating air heated ovens for preheating and baking paint finish on airplane engine castings.

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Revolves in complete circle; wall bracket type also available. Either model is ideal for foundry use in combination with a Conco Hoist. Real floor space savers.

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(*Continued from page* 208)

acid, leaving the boat and contents still in the tube, allow the combustion to proceed for another 5 minutes. Then momentarily disconnect the oxygen supply. This will wash out any sulphuric acid that may have formed in the delivery tube. If the indicator changes, titrate the acid formed and repeat the combustion until the indicator remains blue after 5 minutes of burning.

The total number of milliliters of standard sodium hydroxide used times its factor (expressed in terms of per cent sulphur per milliliter) divided by the weight of the sample equals per cent sulphur in the brass or bronze.

If sulphur is to be determined on another sample, the burned sample is withdrawn from the combustion tube and the new sample is inserted. The combustion then is started, using the same absorbing solution which previously had been adjusted to the end-point by the preceding determination.

Occasionally a blank determination is run to check the purity of reagents.

Sulphur in a number of National Bureau of Standards standard samples was determined by the previous procedure. The accompanying table gives a few comparative results.

Results Obtained

(a) National Bureau of Standards standard sample No. 124, ounce metal

Sulphur Present Percent	Sulphur Found Percent	Deviation Percent
0.071	0.072	+0.001
	0.071	±0.000
	0.074	+0.003
	0.070	−0.001
	0 070	−0.001
	0.069	−0.002
	Average=0.071	±0.0013

(b) National Bureau of Standard standard sample No. 63a, phosphor bronze bearing metal.

Sulphur Present[1] Percent	Sulphur Found Percent	Deviation[2] Percent
0.11	0.097	−0.001
	0.098	±0.000
	0.10	+0.002
	0.097	−0.001
	0.10	+0.002
	0.098	±0.000
	Average=0.098	±0.001

[1] Provisional Analysis
[2] From average of 0.098

With standard sample No. 124, ounce metal [Part (a), in the table] excellent results were obtained. Standard sample No. 124 contains 0.071 per cent sulphur. The average value of 0.071±0.0013 per cent sulphur was obtained by the combustion method described.

With standard sample No. 63a, phosphor bronze bearing metal [Part (b), in the table] the results obtained by the combustion method described were not in very close agreement with the wet method[11]. The sulphur value given (0.11 per cent) is the provisional analysis of the standard sample. It is well known that the precipitation of $SO_4^=$ as $BaSO_4$ is subject to error. The method has been applied successfully to bronzes containing 1.00 per cent sulphur.

No substances were found that inter-

(*Concluded on page* 212)

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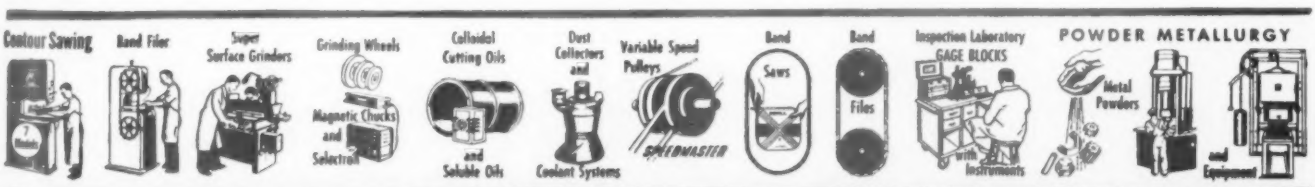

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(*Concluded from page* 210)

fered with the method.

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In this work the variable temperature combustion (Varitemp) furnace was supplied by Harry W. Dietert Co., Detroit, the sample boats (Leco No. 1) by Laboratory Equipment Corp., Benton Harbor, Mich., and the combustion tubes were Zircofrax type. Hydrogen peroxide solution is Merck's Superoxal, and chromium sesquioxide is Baker's.

The authors wish to express their deepest appreciation to T. S. Woodward, chief chemist, Carnegie-Illinois Steel Corp., Youngstown, O., for his work in checking some of the samples and for his very helpful comments in the development of the combustion method for the determination of sulphur in brass and bronze.

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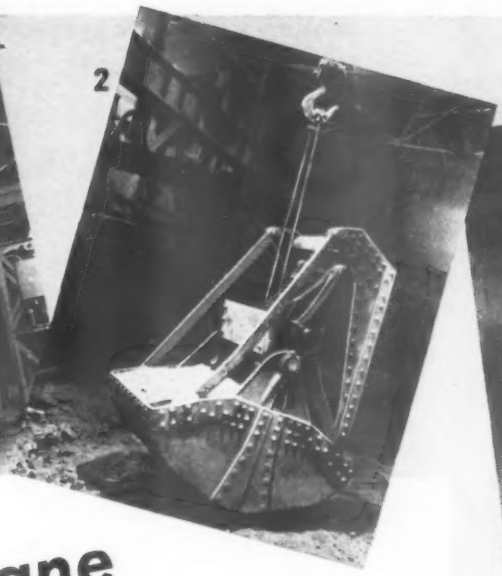

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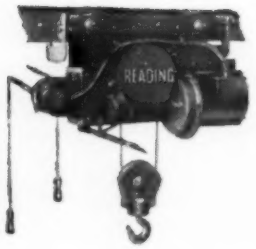

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MEETING OF BRITISH FOUNDRYMEN

(*Continued from page* 92)

tional Engineering Co., Ltd., Birmingham, was re-elected senior vice president, and Dr. T. Swinden, director of research, United Steel Companies Ltd., Sheffield, was elected junior vice president. The following members were elected to the council for a period of two years: H. Bunting, East Midlands Branch; Dr. A. B. Everest, Mond Nickel Co., Ltd., London branch; E. J. L. Howard, Lancashire branch; A. Phillips, Lancashire branch; R. B. Templeton, managing director, Ealing Park Foundry Ltd., London branch.

The secretary then announced that cables of greetings had been exchanged between the A. F. A. and the institute. He also announced that the case of *Proceedings* of the institute for 1941-42 (Vol. XXV) that had been sent to the members of the South African branch had been lost through enemy action and a request was made to any firm or individual who had unwanted copies to send them to the secretary in order to build up another supply since the volume is now out of print.

Mr. Gardom then took the presidential chair and delivered his presidential address. After recalling his early metallurgical studies under the late Sir Harold Carpenter, he said he thought that in electing him the institute wished also to honor the Technical Committee of which he had been convener for the past 12 years, and for that reason also he had chosen as subject of his address "The Technical Man".

Technical Man Bridges Gap

Mr. Gardom described the technical man as having come naturally into being to bridge the gap between the artisan and the academic man. He explained that in order to enter this sphere the academic man could come down from the university and the practical man could come up from the foundry floor, providing each had the capacity to appreciate and understand the other's work. He pointed out that the technical man was usually unassuming and should assert himself; his main qualities were integrity, honesty and the enjoyment of his work for itself which sometimes resulted in lack of appreciation of his work by the business man. He has developed to a very high degree the power of vision, and was thus ready to act boldly, refusing to be discouraged by theoretical impossibilities.

Referring to the time given by the institute to consider education and training of youths coming into the industry, the speaker said that there was as yet no standard course of part time study which could be followed by a man interested in the technical aspect of founding and

(*Continued on page* 216)

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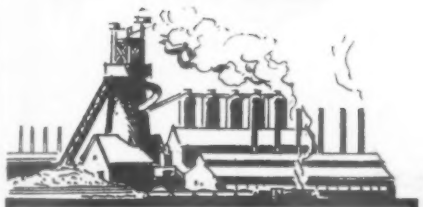

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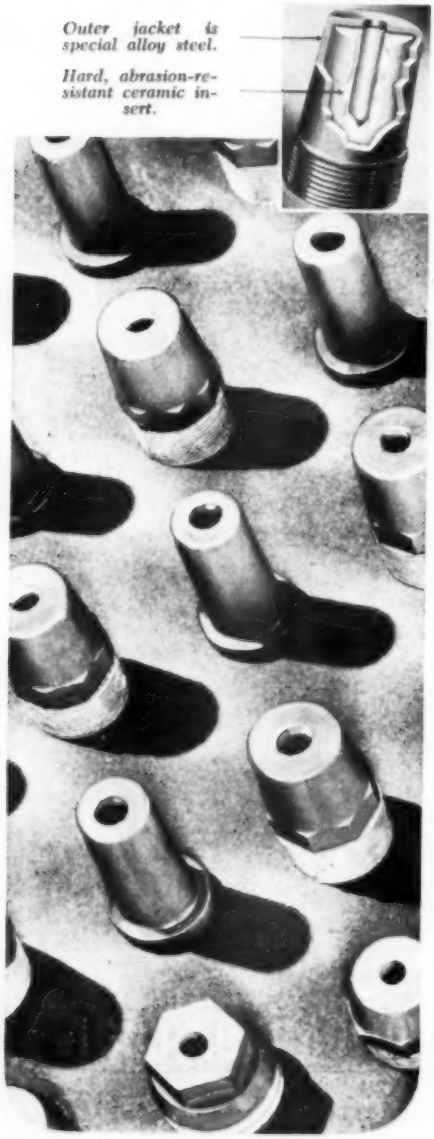

(*Continued from page* 214)

no recognized examination which could be taken as a proof of ability and knowledge. He would like to see established a technical diploma which would show that the holder had not only knowledge of foundry subjects but also that he had satisfactorily filled a works position for two or three years, and he suggested this as a scheme that could be undertaken by the newly constituted Technical Council.

Mr. Gardom then asked the council of the institute to consider the creation of a technical student grade, members of which would be eligible to sit on technical sub-committees. While these students would not take part in any of the work carried out by the sub-committees, they would benefit from the discussions and would be required to write brief reports of each meeting. Mr. Gardom expressed the wish that expenses incurred in attendance at such meetings should not be borne by the individual or his employers and he had asked the council to accept a sum of money to be used for this experiment. He hoped that eventually a memorial fund, bearing the late Sir Harold Carpenter's name, would be built up to make such an arrangement permanent.

Turning to the future of the industry, the speaker said he was sure there would always be a very wide field available for castings, especially if the industry remained alive to the knowledge gained during the war, and concentrated on production and quality. He suggested that a first responsibility was to see that any casting was made in the most suitable metal, and that an authority could be set up to decide which metal was most suitable for any particular application, to inspect causes of unsatisfactory service and to report on incorrect applications and lack of quality; also to give assistance in the early discussion of new designs, acting as the liaison between designer, engineer and producer. This came well within the technical man's sphere.

Speaker Looks to the Future

Mr. Gardom also emphasized the advantages of high production and suggested that buildings should be designed to house adequately the necessary modern plant and equipment. Building costs should be reduced by the application of up to date methods of production in the building industry.

In conclusion, Mr. Gardom said he felt very strongly that the future of the industry was bound up with the future of the technical man. He said that the essentials for future prosperity, as relating to the technical man, were confidence, decision and reward or incentive.

The presidential address was followed by the presentation of the Edward Williams lecture, which was given by Sir Charles G. Darwin, director, National Physical Laboratory. The subject of the lecture was "Tolerances and Inaccuracies in Physics", and the lecturer gave a fascinating account of the range of inaccuracies and tolerances that have to be met in physics and in the application of physics to instruments and measurements used in industry. The lecturer went all over the scale, from the highest figures that can be met with in mathematics down to the size of the atom and the electron. Reference also was made to the use of the microscope and to the varying degrees of accuracy obtainable with this instrument in its ordinary construction, and of the increased accuracy that can be obtained by the use of oil immersion, ultra-violet rays, x-rays, etc.

Technical sessions commenced on the evening of Friday, June 9. The first paper to come up for discussion was a report by the Mechanical Development Sub-Committee of the Technical Committee on "Mechanical Handling in Foundries". This report was presented by J. Gardom, convener of the Technical Committee, who gave a very comprehensive review of the plant and equipment available for use in a completely mechanized foundry, from the stockyard to the inspection department and the storage and despatch department. A report of this nature was bound to give rise to lively discussion based on the varying experiences of the numerous members who attended the meeting. Some speakers gave a word of caution against over-mechanization and on the effects brought about by the intensive use of machinery on labor, but the paper generally was commended for the large amount of work and detail that had been put into it, and most speakers agreed that it gave a very useful lead to the industry which definitely was faced with the necessity of studying and adopting methods of high production by mechanization to a greater extent than heretofore.

Discusses Sandslinger Field

The next paper on "Sandslinger Molding Practice" was by W. Y. Buchanan, foundry manager, John Lang & Sons Ltd., Glasgow. Here again this paper gave rise to an interesting discussion, and it was pointed out that the sandslinger should not be propounded to the detriment of the plain molding machine, but that it was a most valuable piece of equipment for certain types of castings. F. J. Cook, past president of the institute and honorary life member, pointed out that the choice between ordinary molding machines and sandslingers depended to a large extent upon the quality of the sand, and if large quantities of sand were to be used, the use of the sandslinger was advisable.

H. J. Young, Manchester branch, mentioned that the most perfect castings he had met were hand rammed and had been produced in quantities. He made a plea for the skilled craftsman and said that mechanical casting gave more wasters. He pointed out that the results obtained from the sandslinger did not only depend on the time saved but also on the volume of orders that could be obtained. He also referred to the interruptions caused by mechanical failures, to which Mr. Buchanan replied that it was the foundryman's job to treat his plant properly and to do the little things that

(*Concluded on page* 218)

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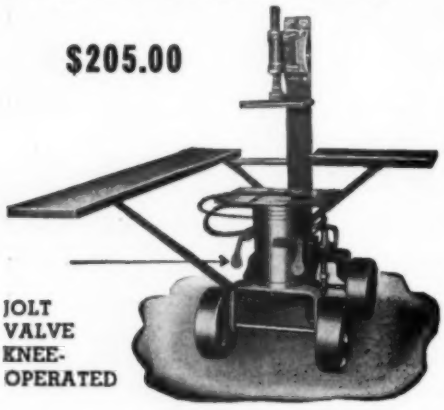

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(*Concluded from page* 216)

would help to keep it going.

One speaker confirmed the good points brought out by the author of the paper in favor of the sandslinger, stating that it places each grain of sand individually and gives very good aeration with no soft or hard spots. Criticism might be made owing to the strain caused to the operator in bringing the impeller to the mold. Another speaker referred to the application of the sandslinger to the making of difficult cores.

J. Roxburgh, East Midlands Branch, asked how one dealt with the transport of the molds and the withdrawal of patterns in comparison with the roll-over machine. Mr. Buchanan replied that the sandslinger could be used with a crane to roll-over the mold, in conjunction with a stripping machine.

Three sessions took place in the afternoon of Saturday, June 10, one session being particularly devoted to steel and cast iron, another one to heat treatment and testing, and which included the first report on basic lined cupolas by the Melting Furnaces Sub-Committee. The third session included the American Foundrymen's Association exchange paper, and a paper on gravity die castings.

The exchange paper was by M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., Peoria, and in the absence of the author, it was presented by J. J. Sheehan, Coneygre Foundry Ltd., Tipton, Staffs. and past president of the Birmingham branch. The subject of the paper was "Wartime Calls on Women to Make Aluminum Air-cooled Cylinder Heads". This paper was accompanied by a film describing the whole process of making a cylinder head.

Contact Maintained with A.F.A.

. The discussion was opened by Vincent Delport, European manager of THE FOUNDRY, and European representative, American Foundrymen's Association, who drew attention to the fact that the American Foundrymen's Association was the only outside association with which contact had been maintained since the beginning of the war. Not only had papers been exchanged between the two associations on the occasion of their annual conventions, but since the war a start had been made in exchanging papers between certain chapters of the A. F. A. and branches of the I. B. F. Mr. Delport emphasized the importance of maintaining the contact between the technical associations of the two friendly countries, and suggested that the first semblance of an international congress might be held in the United States with the co-operation of the Institute of British Foundrymen and he hoped in the not too distant future.

The paper and the film were received with acclamation, and in the words of one speaker, were considered as a brilliant piece of work. A number of questions of detail were asked in connection with various aspects of the paper, to which Mr. Sheehan, with his wide experience of American practice, was able to reply in most cases. An enthusiastic vote of thanks was unanimously passed by the meeting.

The next paper in the same session was "The Mechanized Production of Aluminum Gravity Die Castings for the Merlin Engine", by John Vickers, foundry manager, Rolls-Royce Ltd. This paper gave a most detailed description of the methods of producing the famous Merlin engine by the gravity die-casting process.

Replying to a question by V. C. Faulkner, editor, *Foundry Trade Journal*, Mr. Vickers said that no laborers were employed in the shop, except women for sweeping the floors. Many questions were asked by members, to which Mr. Vickers answered in full. He pointed out that many snags were avoided by the use of the experimental foundry attached to the shop, so that before a new development was put into production a considerable amount of experience had already been acquired on the subject. Answering to a question on the treatment of inserts, Mr. Vickers said that no inserts had been used in the particular casting described, but he thought blowing acetylene gas under the insert would be helpful. He also mentioned that all the test pieces were also die-cast.

Trend Toward Die Casting

J. Blakiston, Modern Foundries Ltd., Halifax, thought the paper indicated the trend towards considerable post-war development of the foundry industry, and that larger components would be done by die-casting. He asked the author what was the life of the dies and of what material they were made, to which Mr. Vickers answered that they were made of straight good quality cylinder iron and the life of the dies varied with a number of factors, but that some had given over 100,000 castings—so far no growth had been observed in the dies. One speaker suggested that the percentage of wasters of 5 per cent seemed rather high in a mechanical process, and the author replied that in his opinion wasters might rise to 7 per cent without saying that anything was wrong. He pointed out that the test conditions were very high. The opinion was expressed that the United States were ahead of Great Britain in regard to pressure die-casting but not as regards gravity die-casting.

Other papers presented at the meeting were: "Steel Mixes and Inoculants In Grey Cast Iron," by W. Barnes and C. W. Hicks; "The Development and Production of Inoculated Cast Iron," by H. P. Hughes and W. Spenceley; "War-Time Developments in Whiteheart Malleable," by G. R. Webster; "The Speeds of Rotation in the Centrifugal Casting Process," by J. E. Hurst; "The Control of Composition and Heat Treatment in 0.25 per cent Carbon—1.5 per cent Manganese Steel Castings," by T. W. Ruffle; "Relationship of Brinell Hardness and Yield Stress in Certain Cast Steels," by T. W. Ruffle, and "Modification by Heat Treatment of Cast Structures and Properties," by H. T. Angus.

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SPECIFICATIONS BY A.S.T.M.

(*Continued from page* 93)

production of guns by the centrifugal method. He indicated that the first work in that direction was done in 1926 and that development work was continued until 1939 when the present emergency brought about tremendous expansion in the field. He showed a number of slides of the equipment and results in producing 90 millimeter guns. Colonel Zornig stated that induction melting is used with furnaces at the casting machines. The centrifugal cast guns are heat treated by quenching and tempering in the same manner as forgings. He discussed the problem of holding the spongy section in the center to the smallest possible cross section, showed the effect of cold shuts, and indicated other defects such as rings.

Dr. Schuh traced the history of the development of centrifugal castings and referred to the work of the Ford Motor Co. and the impetus provided by the war. He stated that the greatest growth had been in the connection of vertical axis spinning. Reasons for the increase in the use of the centrifugal casting process were given as follows: Unusual demand for metal parts; low capital investment to get into production; flexibility of operation; economy of production; quality of product. Mr. Nass showed a variety of slides indicating the work that is being done by his organization and pointed out some of the difficulties which are encountered in producing castings centrifugally.

Report Indicates Changes

Report of Committee A-1, presented at the session on steel and corrosion of iron and steel, indicated certain changes in connection with steel castings. The report states that an April 26, 1944, emergency alternate provisions became effective involving three widely-used specifications for steel castings for high temperature service, A95 (carbon steel), A157 (alloy steel), and A216 (carbon steel for welding). One part of the emergency alternates provides emergency hydrostatic test pressure requirements which tie in with the American War Standard for Pressure-Temperature Ratings for Steel Pipe Flanges, Flanged Fittings and Valves (ASA No. B16e5-1943) and clarify the time of testing, namely after rough machining. This is the only problem in Specifications A157, whereas in the other two emergency provisions new grades are being added.

In the more general specifications, A95, a new grade with tensile strength of 65,000 pounds per square inch, yield point of 35,000 pounds per square inch, elongation in 2 inches of 20 per cent, a reduction in area of 30 per cent, is being set up. A grade with similar properties, but with modified chemistry, is being established in Specification A216 which covers carbon-steel material suitable for fusion welding for service up to 850 degrees Fahr. In the latter specification, two existing emergency grades for pressure-containing turbine castings are continued, the new grade EWCB being considered suitable for valves and fittings.

The report of Committee A-1 also indicated that because of a definite interest in the field of magnetic particle testing and inspection for steel castings, a group has drafted a recommended procedure involving magnetic particle inspection of steel castings. A study also is being conducted on stray, residual elements in castings.

Committee A-3 on Cast Iron recommended that the emergency alternate provisions in the Standard Specification for Lightweight and Thin-Sectioned Gray Iron Castings (A190-40) be incorporated in the standard.

That committee also reported that Subcommittee I on Pig Iron had appointed a special committee to prepare a simplified specification for foundry pig iron. Dr. MacKenzie is chairman of the sub-subcommittee and T. G. Johnston, Republic Steel Corp., Cleveland, and Dr. C. H. Lorig, Battelle Memorial Institute, Columbus, O., are members.

Approve Standard Specifications

Subcommittee VI on General Castings has reviewed and reaffirmed the standard Specifications for Gray Iron Castings (A48-41). Further study is to be made of the requirements for the optional transverse test and the possibility of giving some guide as to the brinell hardness for the various classes of gray iron castings. Work on a study of brinell and its relation to tensile strength also is under way.

Subcommittee VII on Microstructure of Cast Iron reported that an addition to the preferred methods of polishing in the Tentative Recommended Practice for Evaluating the Microstructure of Graphite in Gray Iron (A247-41T) is under consideration. In the meantime, it was recommended that the practice be continued as tentative. Subcommittee XXII on Elevated Temperature Properties of Cast Iron reported that proposed tentative specifications for cast iron for use in pressure parts, within the temperature ranges of 450 to 650 degrees Fahr. are being prepared by the subcommittee.

Report of Committee E-4 on Metallography contained rather extensive proposed revisions in Tentative Methods of Preparation of Metallographic Specimens (E3-42T). This includes a new section on magnesium and its alloys.

Report of Committee A-7 on Malleable Iron Castings contained a revised tentative specification for Pearlitic Malleable Iron Castings. An alternate tension test specimen, proposed by Subcommittee I on Specimens and Methods of Testing, was recommended for publication as a tentative revision in the

(*Continued on page* 222)

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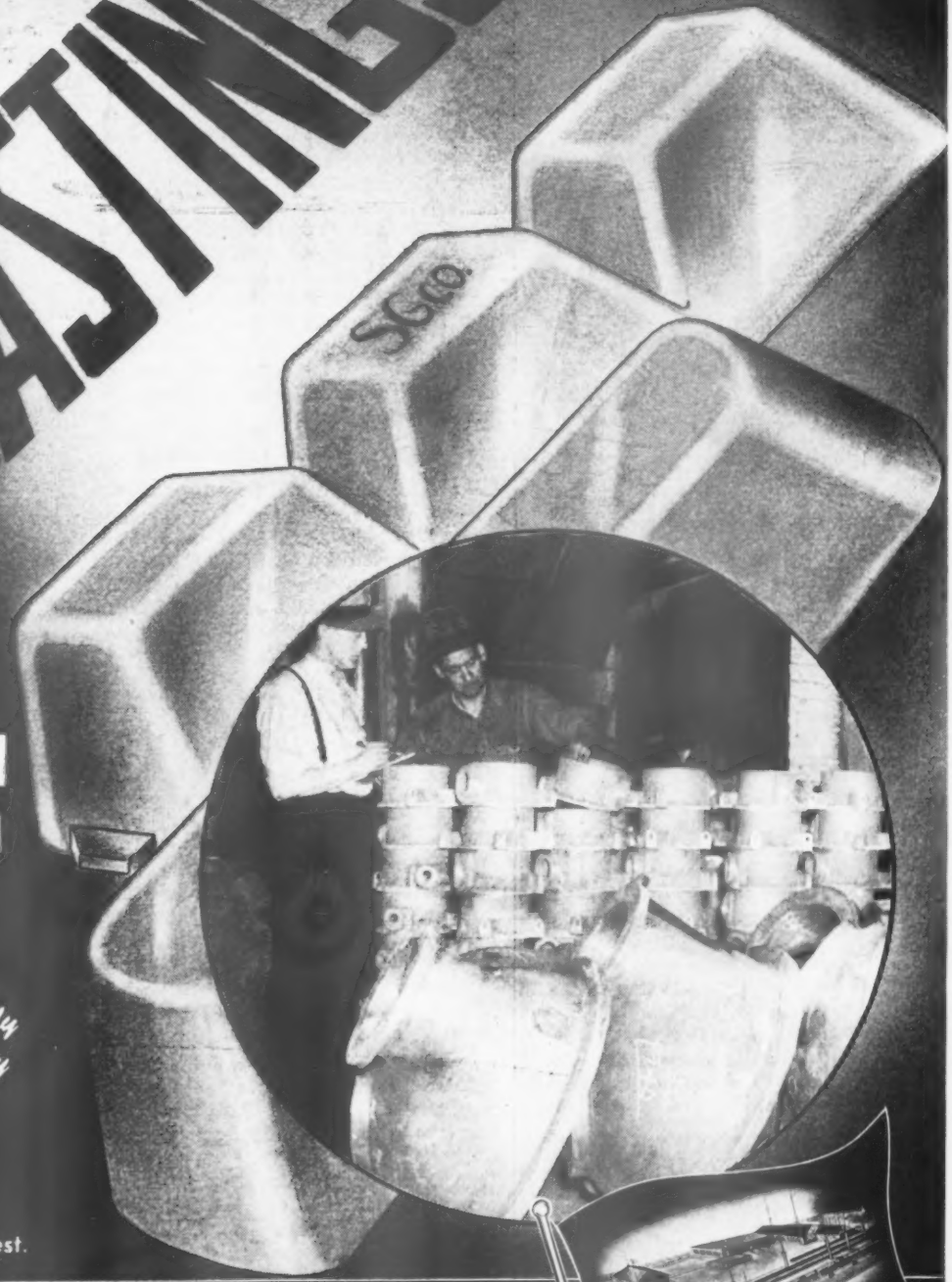

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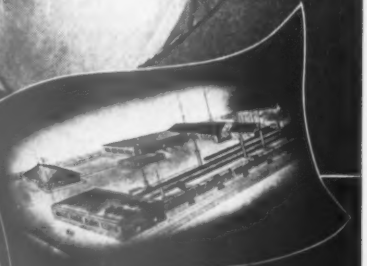

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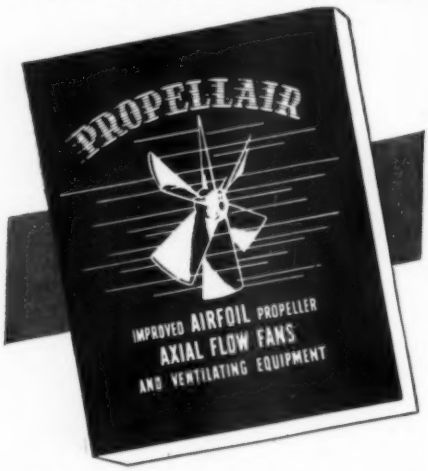

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(*Continued from page 220*)

following standards: Standard Specifications for Malleable Iron Castings (A47-33; ASA G48.1-1942), and Standard Specifications for Cupola Malleable Iron (A197-39; ASA G49.1-1942).

The report states that the large ends of the specimen may be changed to adapt it to individual testing machines. The proposed alternate specimen makes it possible to test malleable specimens and steel specimens without making any change in the testing machine holders. No difference in quality is anticipated.

At the first nonferrous session, considerable discussion was brought out by a paper, "Evolution of Test Specimen for Nonferrous Castings," prepared by A. J. Smith, Lunkenheimer Co., Cincinnati, and presented by John W. Bolton of that organization. The paper reviewed the historical development of several prescribed specimens, especially those for cast tin bronzes and related alloys. The specimens considered were shown to be inadequate as true measuring sticks since frequently they lead to deceptive results and do not find justification based on a logical development background. Tha author advocated the design and adoption of specimens according to sound metallurgical principles.

Foundrymen Show Little Interest

In discussing the paper, Dr. G. H. Clamer, Ajax Metal Co., Philadelphia, stated that the Ingot Metal Institute is financing a study on test bars and test bar practices. Sam Tour, Sam Tour & Co. Inc., New York, stated that the criticism of the paper was directed chiefly to the field of brass and bronze. Mr. Tour then pointed out that a contributing factor to the situation in the brass and bronze fields is the lack of interest and lack of help on the part of nonferrous foundrymen. Today the greatest driving force in the field is provided by producers of ingot metals, and not by foundrymen. Foundrymen are not active in the work of committees, and users of castings, outside of the government, also show little interest. Mr. Tour said it is high time that nonferrous foundrymen wake up to the fact that they are in business and that this business should be protected.

W. E. Martin, Sperry Gyroscope Co., Flushing, N. Y., stated that a test bar merely is a report whereby one can determine that the metal was in the proper condition at the time it entered the mold. For other data on the casting, additional inspections are needed. He stated that foundrymen must co-operate with designers and engineers to see that the correct practice is set up, and then to see this practice is held that way during the production run. In closing the discussion, Mr. Bolton stated this is only one phase of a larger problem in the brass and bronze field.

Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought pointed out that during the year previous to the meeting the committee had recommended eight emergency alternate provisions in standards relating to nonferrous castings. However, careful study of castings and ingot specifications indicated that extensive revisions of the various standards would bring them substantially into line with those sponsored by the Conservation Division, WPB, and that the same compositions and physical properties with few minor exceptions, now will be standard for the Navy, Federal, S.A.E. and A.S.T.M. specifications.

Hence, all A.S.T.M. emergency alternate provisions applying to copper-base ingots and castings have been cancelled, except that the casting specifications still will carry emergency alternate requirements for cast-to-size test bars as recently issued (see page 190, THE FOUNDRY for April). Specifications involved include: Castings of the Alloy Copper 88 per cent, Tin 8 per cent, Zinc 4 per cent (B60-41); Steam or Valve Bronze Castings (B61-42); Composition Brass or Ounce Metal Castings (B62-41); Bronze Castings in the Rough for Locomotive Wearing Parts (B66-38), and tentative specifications for Copper-base Alloys in Ingot Form for Sand Castings (B30-42T); Leaded High-strength Yellow Brass (Manganese Bronze) Sand Castings (B132-41T); Tin-bronze and Leaded Tin-bronze Sand Castings (B143-42T); High-leaded Tin-Bronze Sand Castings (B144-42T); Leaded Red Brass and Leaded Semi-red Brass Sand Castings (B145-42T), and Leaded Yellow Brass Sand Castings for General Purposes (B146-42T).

Recommend New Specification

Report of Committee B-4 on Electrical-heating, Electrical-resistance, and Electric-furnace Alloys recommended a new tentative specification for Chromium-Nickel-Iron Alloy Castings for High-temperature Service which pertains to the 24 per cent chromium-12 per cent nickel alloy intended for structural elements, containers and supports in electric furnaces and for similar applications up to 2000 degrees Fahr. The report also indicated that further experimental work on the effect of sulphur has been delayed because of the war program but will be continued, and that the application of the method to cast as well as wrought alloys will be considered. Subcommittee V on Wrought and Cast Alloys for High Temparature Service has decided to collect and correlate data looking to the preparation of specifications for alloy castings composed of 35 per cent chromium, 16 per cent nickel, balance iron, for electric furnace applications.

Report of Committee B-3 on Corrosion of Nonferrous Metals and Alloys included voluminous data on atmospheric tests of nonferrous metals and alloys gathered by Subcommittee VI, and gave detailed information on tension tests from specimens cut from 9 x 12-inch plates which had been exposed for 10 years at various test stations in this country. The report also mentioned that other subcommittees are studying total immersion, alternate immersion and spray testing to devise more suitable procedures, and that

(*Concluded on page 224*)

"BONDITE SAVES TIME AND FOUNDRY LABOR COSTS"

says Wm. H. (Bill) Duvaney, foundry superintendent, Pomona Pump Co.

CASE HISTORY No. 2

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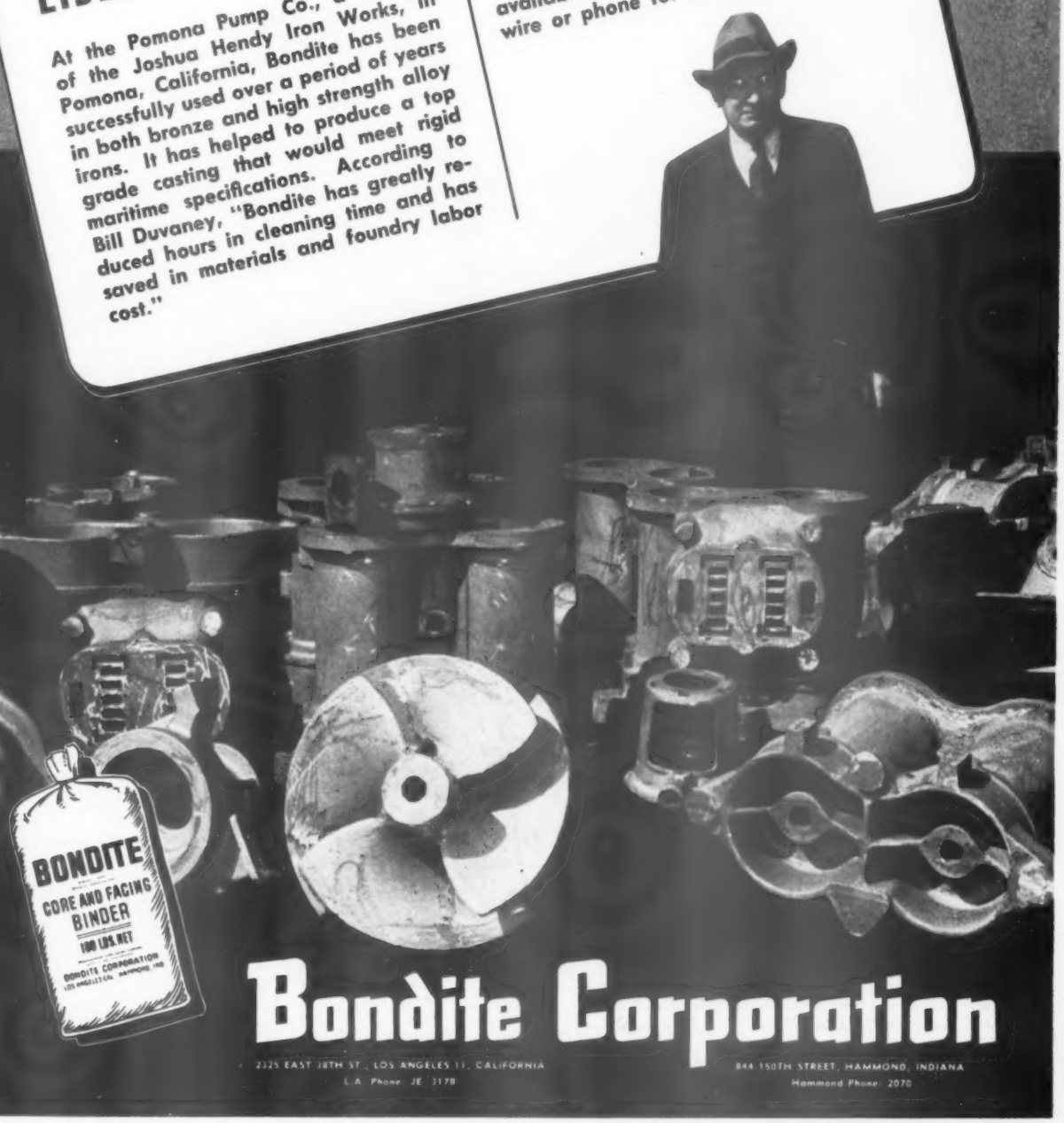

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(*Concluded from page 222*)
a program is under consideration for testing magnesium and magnesium alloys in couple combination with other metals.

At the closing session on nonferrous metals and alloys the report of Committee B-7 on Light Metals and Alloys, Cast and Wrought recommended revision of six tentative standards relating to aluminum-base and magnesium-base castings, and a proposed code system for designation of magnesium-base alloys. Standards involved include those for Aluminum-base Alloy Sand Castings (B26-43T); Aluminum-base Alloys in Ingot Form for Sand Castings (B58-42T); Magnesium-base Alloy Sand Castings (B80-41T); Magnesium-base Alloys in Ingot Form for Sand Castings and Die Castings (B93-41T); Aluminum-base Alloy Permanent Mold Castings (B101-43T); Aluminum-base Alloys in Ingot Form for Permanent Mold Castings (B112-41T).

Code system for designating magnesium alloys includes letters to indicate alloy constituents and numbers for approximate composition. Letters are *A* for aluminum; *M* for manganese where it is a primary constituent; *S* for silicon; *Z* for zinc; *T* for tin; *D* for cadmium, and *X* for high purity where iron and nickel are controlled to low limits. Hence a binary alloy containing 4 per cent aluminum would be designated A4 while an alloy containing 6 per cent aluminum and 3 per cent zinc would be designated AZ63.

P. F. George, Dow Chemical Co., Midland, Mich., presented a paper entitled "A Numerical Rating Method for the Routine Metallographic Examination of Commercial Magnesium Alloys" which described preparation of the specimens, etching to indicate metallographic structures, and the examination of the microstructures revealed. Grinding of specimens is accomplished on a series of abrasive-coated cloth disks over oil tanks to catch the fine magnesium dust. Polishing is done on wet laps with relevigated alumina. Etching agents employed include *glycol* composed of ethylene glycol 75 per cent by volume, distilled water 24 per cent, and concentrated nitric acid 1 per cent; *acetic-glycol* comprised of ethylene glycol 60 per cent by volume, distilled water 19 per cent, glacial acetic acid 20 per cent, and concentrated nitric acid 1 per cent; *phospho-picral* containing orthophosphoric acid 0.7 milliliters, picric acid 4 grams, and ethyl alcohol (95 per cent) 100 milliliters.

For rating various phases such as the *pearlitic* ($Mg_{17}Al_{12}$-Mg eutectic) precipitate, porosity and burning, grain size, and massive $Mg_{17}Al_{12}$ compound, the author prepared a series of charts showing micrographs based on the percentage of area occupied by the precipitate, or in the case of the grain size in thousands of an inch designated by a whole number.

P. H. Bates, chief, clay and silica products division, National Bureau of Standards, was elected president of the American Society for Testing Materials for the coming year. The new vice president is Arthur W. Carpenter, manager, testing laboratories, B. F. Goodrich Co., Akron, O. Newly-elected members of the executive committee are W. C. Hann, chief chemist, California Portland Cement Co., Colton, Calif.; L. B. Jones, engineer of tests, Pennsylvania railroad, Altoona, Pa.; James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.; J. G. Morrow, metallurgical engineer, Steel Co. of Canada Ltd., Hamilton, Ont., and Sam Tour, president, Sam Tour & Co., New York.

Magnesium Founders Meet at New York

Sand Cast Division of the Magnesium Association had a successful meeting in New York, June 8, with an attendance of more than 70 members. The meeting was presided over by Dan W. Moll, vice president and treasurer, Hills-McCanna Co., Chicago, and chairman of the division.

Manley E. Brooks, foundry metallurgist, Dow Chemical Co., Bay City, Mich., outlined melting and pouring practice for magnesium casting and told of how some of the major troubles can occur. E. R. Coyle, sales manager, Diamond Magnesium Co., Painesville, O., detailed the alloying of magnesium; he told of their development with beryllium and how it eliminates burning to some extent. H. M. Griffith, Hills-McCanna Co., outlined the new test bar proposal for magnesium sand castings.

W. B. Griffin, development engineer, Apex Smelting Co., Chicago, read a paper on "Conversion of Salvage Materials to High Grade Magnesium Alloys." He showed how consistently fine-grain ingot can be produced from such materials which would be well within A.S.T.M. specifications. J. D. Barrington, general manager, Dominion Magnesium Ltd., Haley, Ont., told of some of the high lights of his recent trip to England to visit magnesium operations in that country. He stated that there has been considerable increase in the consumption of magnesium since the metal has become more plentiful.

Oscar Blohm, metallurgist, Hills-McCanna Co., told of the work and recommendations of the Grain Size Committee. Among the recommendations mentioned he stated that 80 per cent scrap should be used in each charge when possible; metal should be refined at around 1360 degrees Fahr. and stirred 4 minutes, and the holding time should be kept at a minimum with the crucibles cooled in the air.

The permanent address of the Magnesium Association now is 3239 R.C.A. Building, 30 Rockefeller Plaza, New York 20, with Perry D. Helser as secretary-director.

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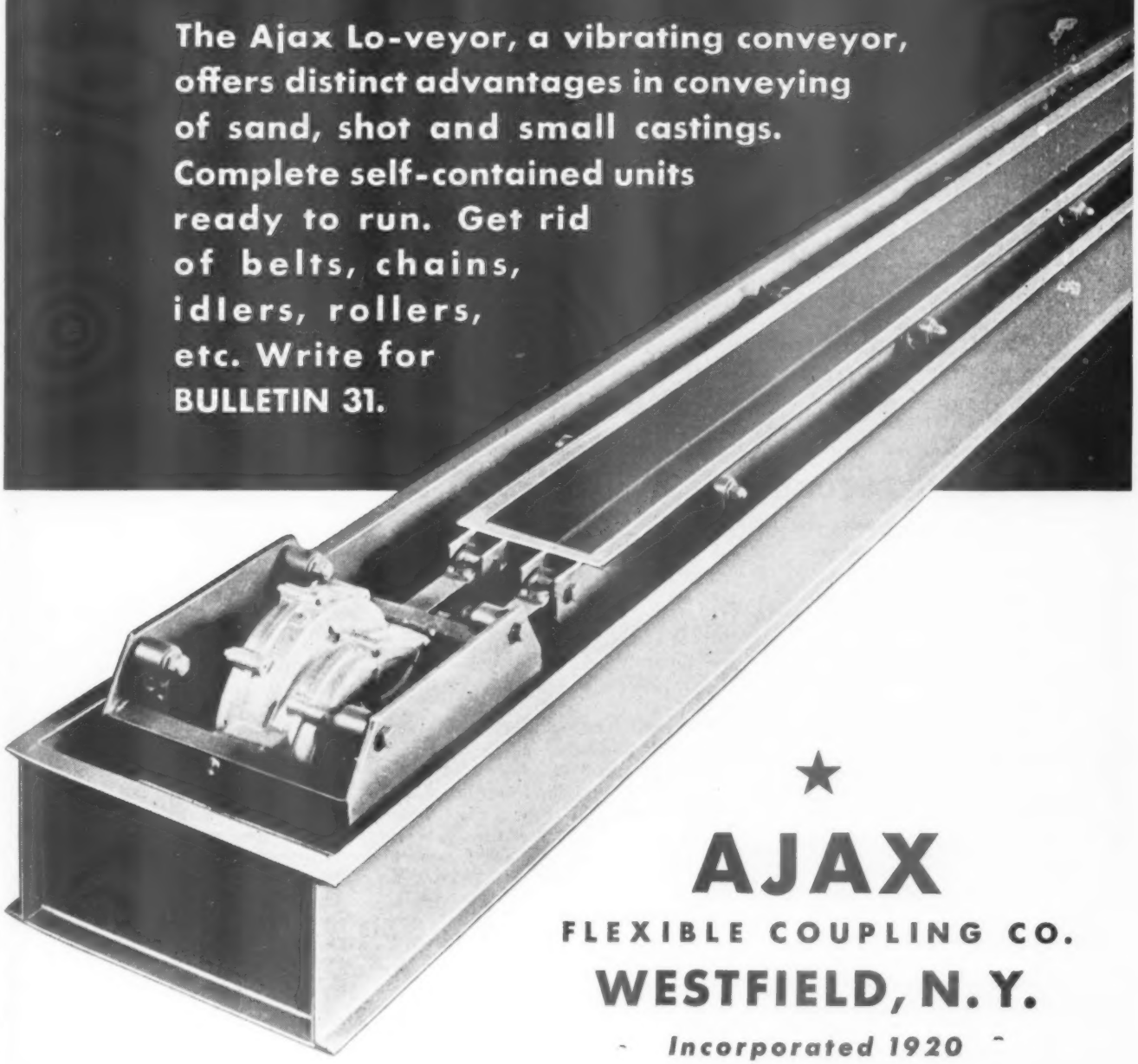

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NEW TRADE PUBLICATIONS

MAGNESIUM DUST CONTROL — Peters-Dalton, Inc., 628 East Forest Avenue, Detroit 1, has published a 20-page booklet on the collection and control of dust and fumes from magnesium alloy processing. The book, written by O. E. Fenn, covers general recommendations, requirements of dust collection systems, safety precautions, precipitating fluid, grinding stands and jacks, portable tool and flexible shaft grinding, metal abrasives, core spraying, shakeout, pouring stations and melting rooms.

COATINGS — Foundry Services Inc., 280 Madison Avenue, New York, has issued a one-page bulletin describing the procedure to be employed in coating old and new permanent molds and dies, and some information on the several types of coatings the firm produces.

THERMOCOUPLES — Wheelco Instruments Co., Harrison & Peoria Street, Chicago 7, announces a new edition of its data book and catalog, Bulletin S2-4. This 36-page catalog shows prices, products, recommendations and suggests substitutes for restricted materials.

ACCESSORIES — Ideal Commutator Dresser Co., 1290 Park Ave., Sycamore, Ill., has issued an illustrated pamphlet showing machine tool accessories, including magnetic chuck, live centers, etcher-demagnetizer, metal etcher, portable demagnetizer, electric tachometer, grinding wheel dresser, balancing ways, variable speed transmission, and electric cleaners.

POWER CENTERS—A 25-page booklet B-3224, available through Department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., contains a time-saving guide to the selection and specification of indoor and outdoor transformer installations. Standard arrangements are suggested to fit various types of distribution systems. The power centers combine all transformer and switching material in one unit.

THERMOSTATIC BI-METALS—Bulletin No. 155, issued by Callite Tungsten Corp., 540 Thirty-ninth Street, Union City, N. J. gives technical data on the thermostatic bi-metal available in five types according to temperature requirements.

BENDING PRESS—A new catalog No. 2010-A on bending presses has just been issued by the Cleveland Crane & Engineering Co., Wickliffe, O. Lavishly illustrated, the catalog has many photographs of work performed and details of construction including a complete table of sizes and dimensions. The bulletin also gives detailed data on the company's bulldozers.

STEEL FOUNDRY — An attractive and well-illustrated brochure recently issued presents a brief history and shop views in the plant of the Warman Steel Casting Co., 6100 South Boyle Avenue, Los Angeles, 11, California.

SAFETY—*Fifty Years in The Service of Safety*, the title of a 32-page brochure recently issued, tells the story of Underwriters' Laboratories, Inc., Chicago, a non-profit, scientific and technical organization devoted to the safeguarding of lives and property from the hazards of fire, casualty and crime.

VIBRATORS—A four page announcement by the Cleveland Vibrator Co., 2108 Superior Avenue West, Cleveland, describes and illustrates various types of vibrators, valves and hose connections, including dimensions and prices.

LUBRICATION—Line cuts, drawings and photographs feature a group of four publications recently issued by Alemite Division of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, describing devices and equipment for applying lubrication to any and all types of bearings.

ELECTRIC FURNACE—A new 15-page bulletin released by the Whiting Corp., Harvey, Ill., deals with the hydro-arc electric furnace, newest addition to their long list of foundry equipment. Covering the application, design, method of operation and advantages of the electric melting furnace, this two-color bulletin is illustrated throughout with photographs and diagrams.

COMPRESSOR—Catalog No. 42-S, issued by Schramm Inc., West Chester, Pa., describes stationary air compressors with belt drive and also with built-in motor drive or engine drive. The catalog presents compressor specifications, dimensions, weights for all types.

CYCLOGRAPH—A 14-page bulletin published by Allen B. DuMont Laboratories, Inc., Passaic, N. J., describes and illustrates the effectiveness of a device and revolutionary method of accomplishing a variety of nondestructive metallurgical examinations. The instrument utilizes the principle that the metallurgical properties cause variations in the core loss of a tuned pickup coil. These variations affect the shape of an easily interpreted visible pattern displayed on a cathode-ray tube indicator screen.

PLATING EQUIPMENT—A complete line of automatic and semi-automatic plating equipment is described and illustrated in a new 41-page catalog issued by Frederic B. Stevens Inc., 510 Third Street, Detroit. Several pages are devoted to tables and general information, circumference and areas of circles, microphotographs of plated parts, wiring, electrical units, weight of wire and tubing, and electrolytic deposit tables for various plating solutions.

WELDING—A handbook of engineering data, welding procedures and heat treatment procedures for tool and die steels has been published by C. E. Phillips and Co., 2750 Poplar Street, Detroit 8, under the title *Arc Welding in The Maintenance and Construction of Tools and Dies.*

GENERATORS AND EXCITERS — Direct-current generators and exciters, ¾ to 75 kilowatt, 2 or 4 poles, 125 or 250 volts, 40 C. continuous shunt or compound wound, are described in folder GEA 1607 D issued by the General Electric Co., Schenectady, N. Y. Illustrations and text cover frames, wire, bearings, windings, brushes, end shields, ventilating system and enclosures.

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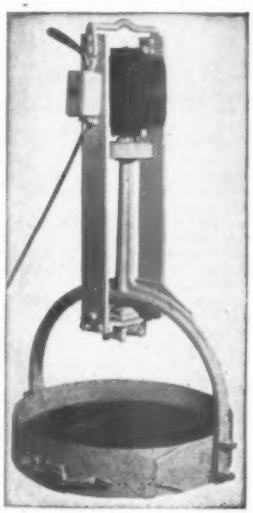

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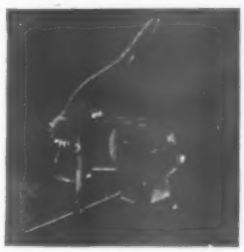

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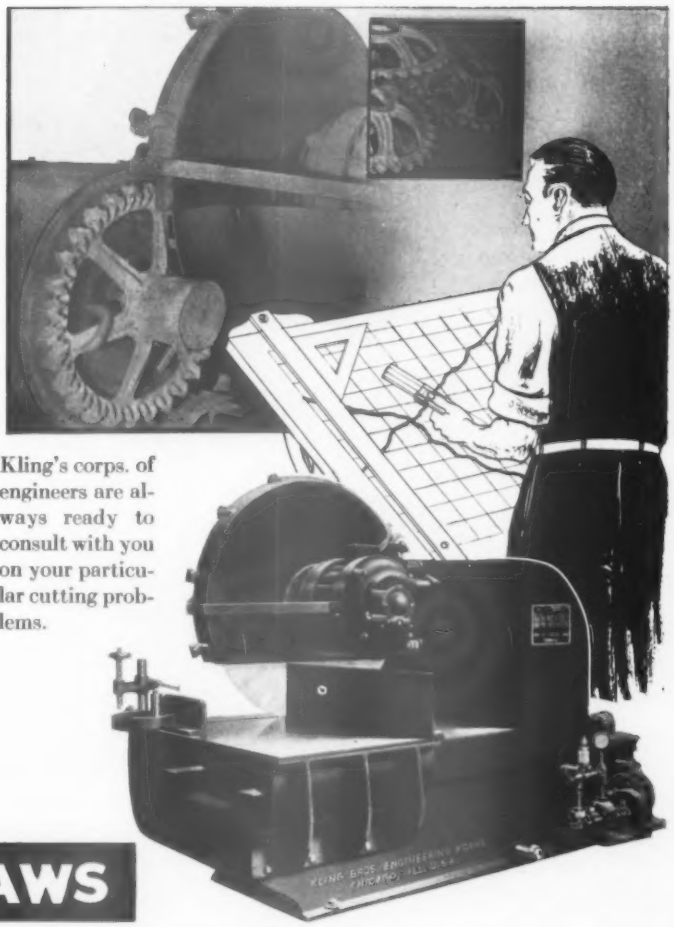

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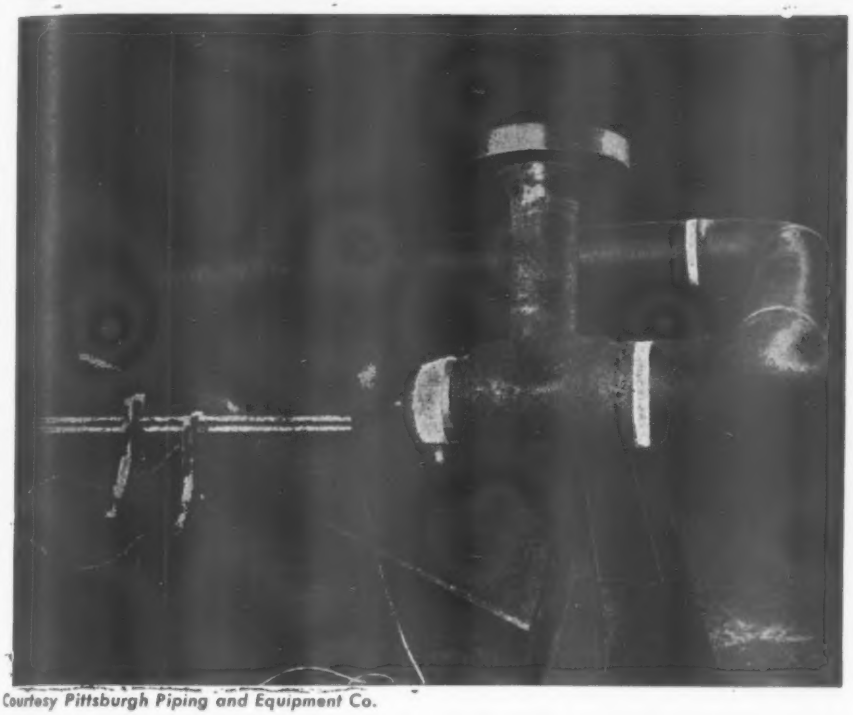

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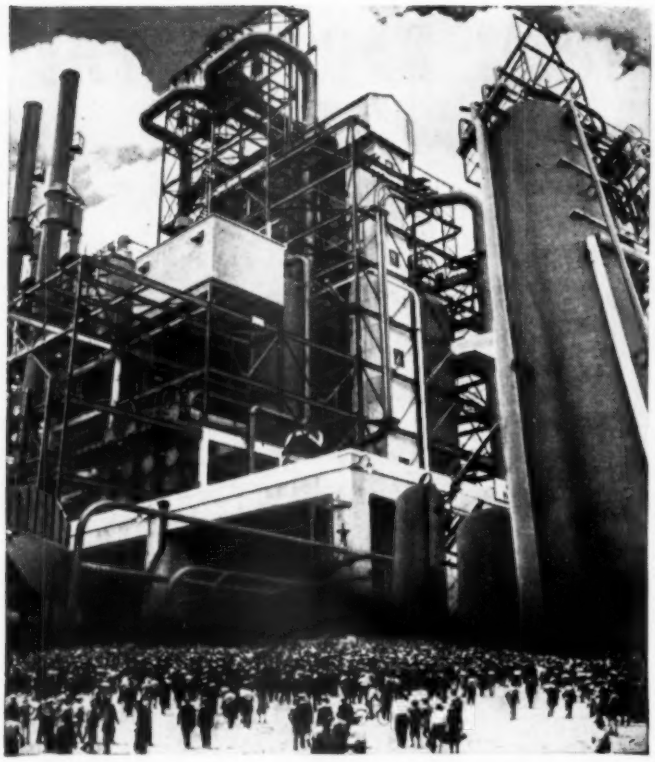

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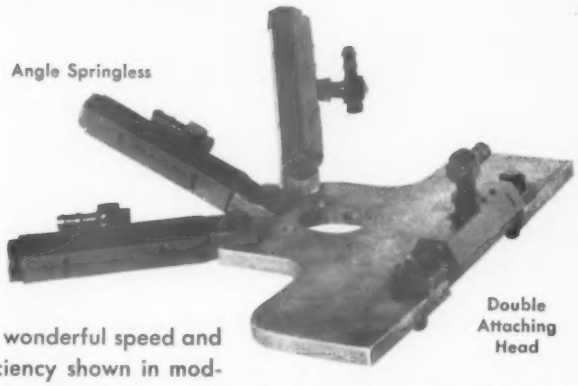

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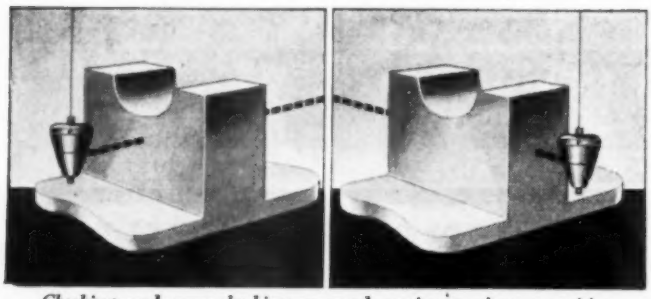

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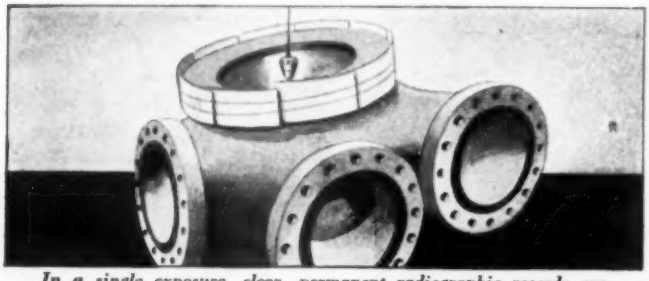

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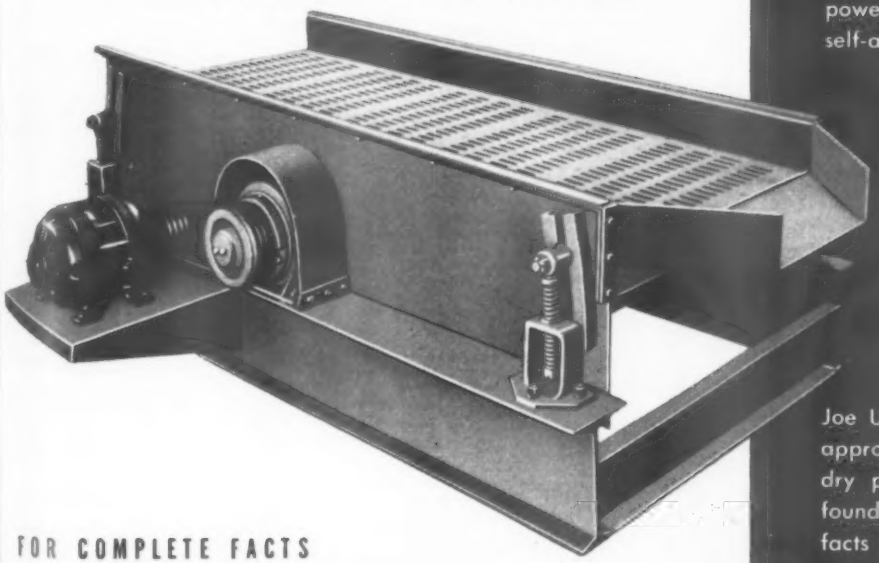

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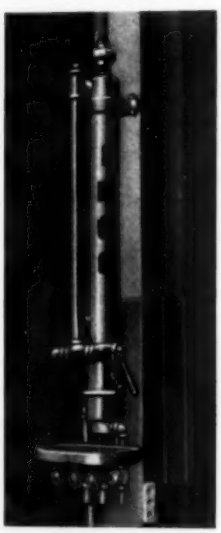

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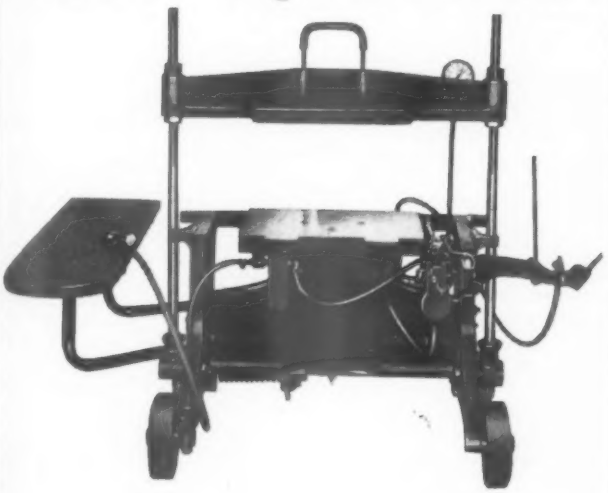

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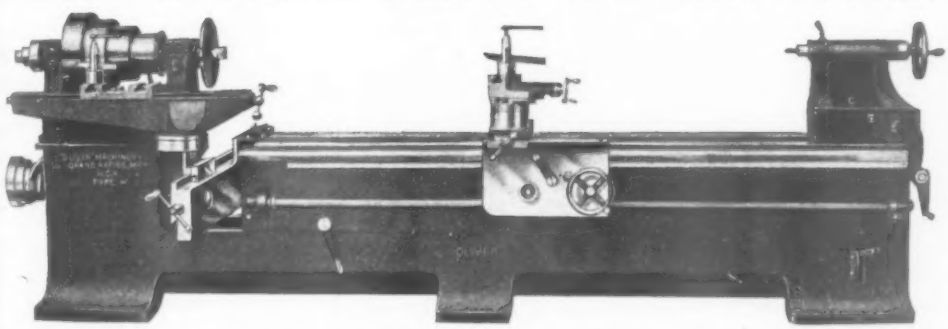

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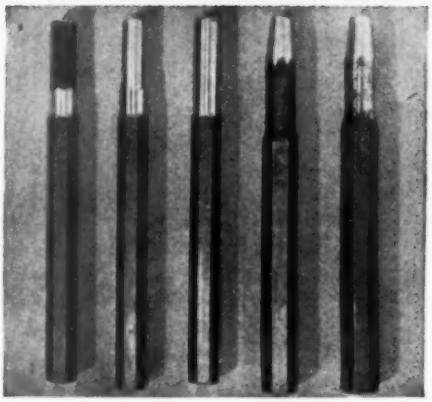

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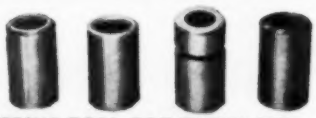

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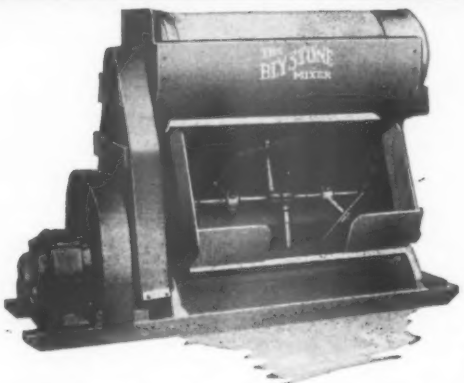

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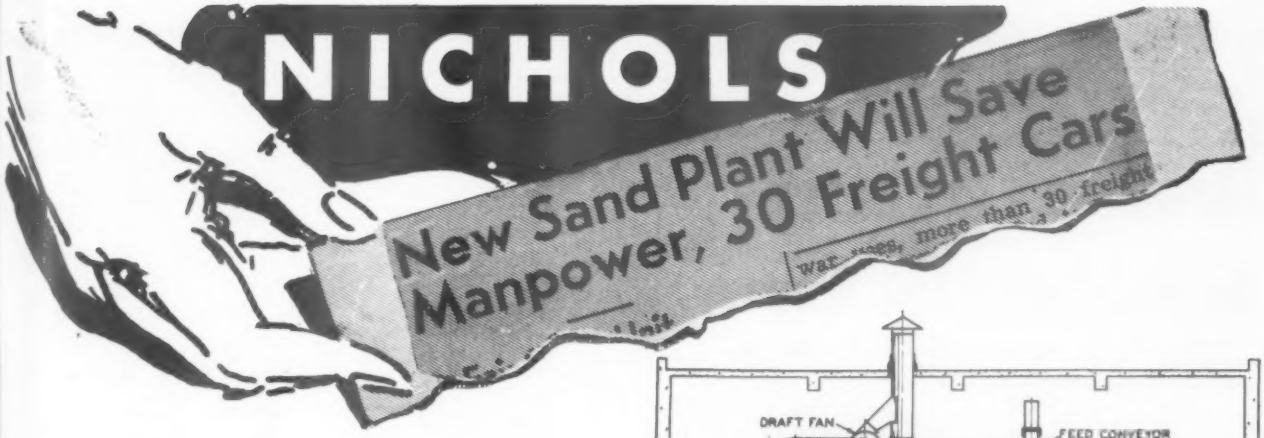

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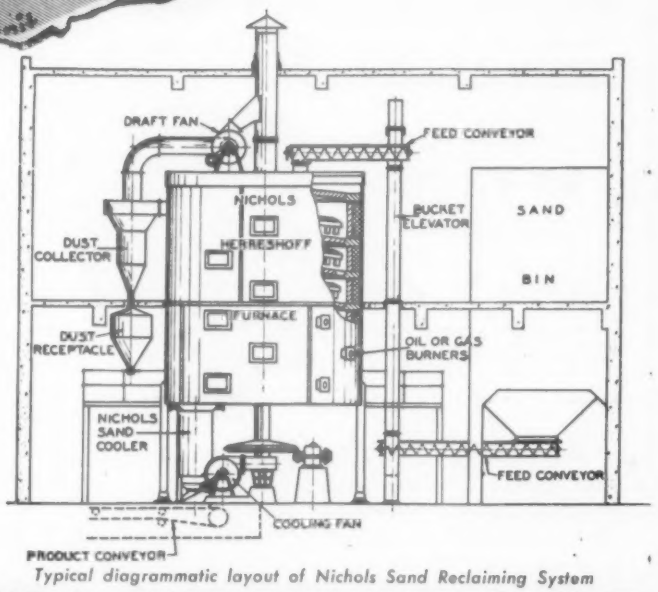

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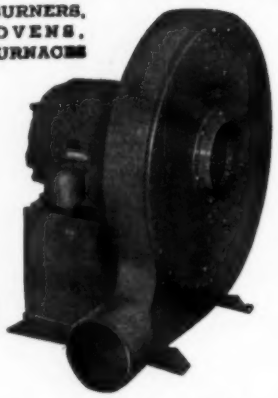

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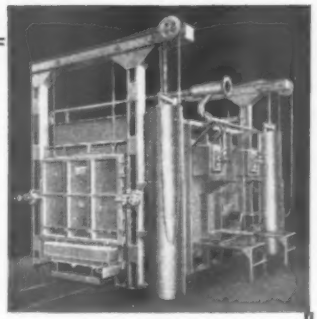

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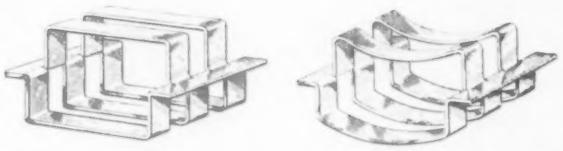

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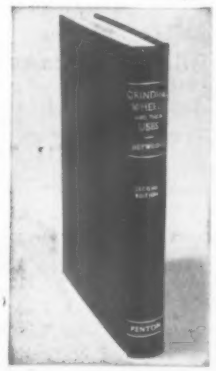

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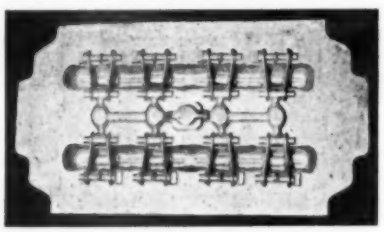

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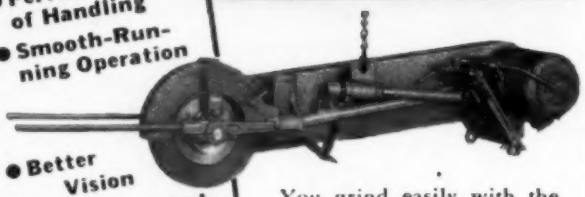

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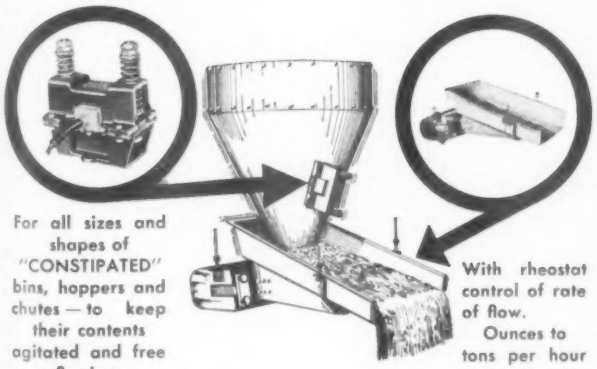

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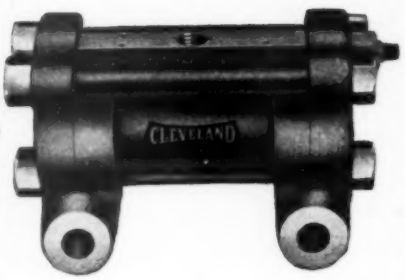

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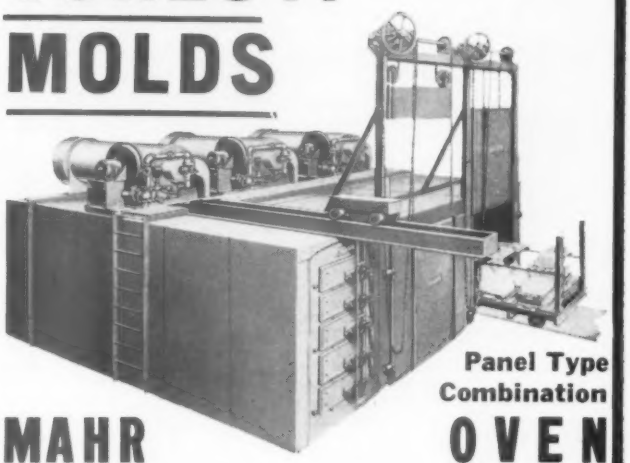

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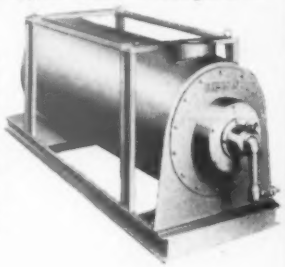

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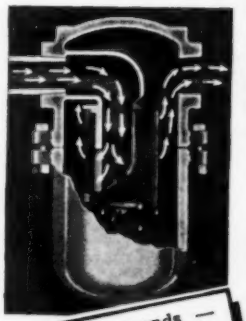

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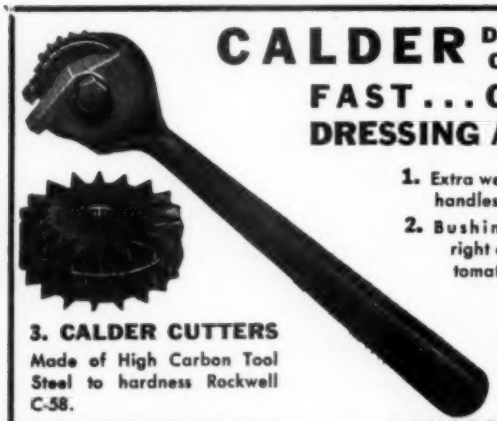

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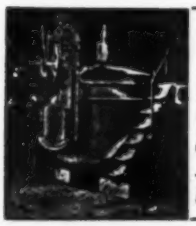

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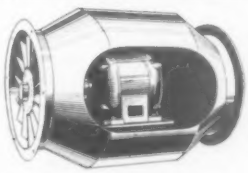

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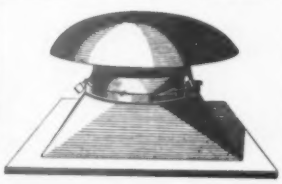

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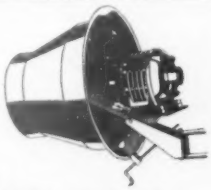

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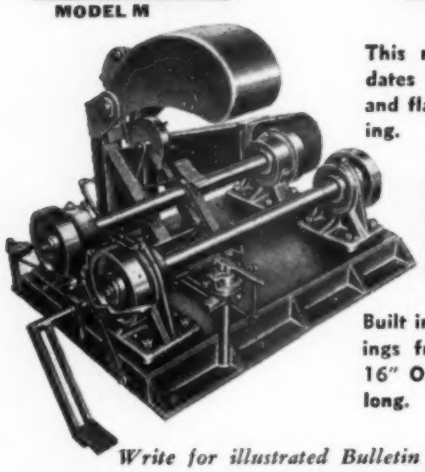

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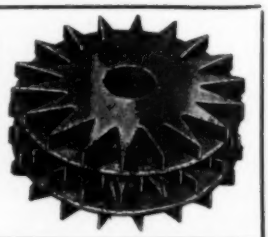

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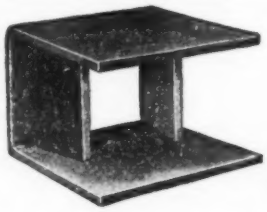

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Used core rod straightener and shear machine with gagger attachment. Must be good shape. Address: Box 522, The FOUNDRY, Cleveland 13, Ohio.

WANTED
Used Tabor-Abrasive Cut-off Machine, Type C 7½F or C 10 AF, with 220 Volt, 3 phase motor. Address: Box 570, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE
Molding Machines, 3, for sale—Hand Squeeze Tabor make. New. Forest Hill Foundry Co., 95 Tiffany Blvd., Newark, N. J. Make offer.

FOR SALE
1 34" diameter x 74" long rebuilt Whiting Exhaust Tumbler, with renewable trunnions, door opening entire length of barrel. ADDRESS: BARNETT FOUNDRY & MACHINE CO., LYONS AVE. AND COIT ST., IRVINGTON, N. J.

REBUILT USED EQUIPMENT
Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.
HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo 21, Mich.

Classified Advertising

For Sale

FOR SALE

Molding machines, flasks, wet dust collectors, sand blast cabinet, steel magnesium melting pots, furnaces, heat treat and metal melting, knockout machine and many other items.

All subject to prior sale FOB Detroit.

Send inquiries to: ATTEN. PURCHASING DEPARTMENT

BOHN ALUMINUM & BRASS CORPORATION
1400 LAFAYETTE BUILDING DETROIT 26, MICH.

FOR SALE

Despatch Drawer Type Core Oven; 4 trays, 8" high, 36" wide, 6 ft. long; 1 tray 16" high, 36" wide, 6 ft. long; Overall dimensions 7½ ft. high by 4½ wide by 7 ft. long; Equipped for Butane Gas at present.

1½ Hsp. Type M 7A Strand Flexible Shaft Grinder; 8 by 1½ by ¾ Wheels; High Speeds 2500-3500-4500 RPM; 220 V, 3 Phase, 60 Cyl. AC; Mounted on 4 wheel Truck and Swivel Base with all standard attachments Like New.

3 Johnston Pressure Blowers with Motors:

(a) Size No-510 Blower with 5 Hsp. Motor, Capacity 1250 CFM 10 oz. Pressure.

(b) Size No-112 Blower with 1½ Hsp. Motor, Capacity 200 CFM, 12 oz. Pressure.

(c) Size No-1516—Blower with 15 Hsp. Mtr. Capacity 1950 CFM 16 oz. Pressure

Whiting "EZ-Pour" Crane Ladle; 23" top Diameter.

Lewis No. 7 Core Wire Straightener & Cutter Machine with GE ½ Hsp. Motor, 345 RPM, 60 cy. Capacity Up to ¼" diameter wire 1" to 12" 220 Volt, 3 Phase; Height Over all 18¼"; long; Speed 80-6" pcs. per minute; Operate by hand or by motor.

Adams Cherry Easy Lift Off Wood Flask; Size 14 by 14 with 8½" cope, 3" Drag, 4° Taper. One ¾" Round Pin and One ¾" Hex Pin with bushing pin centers 17¾".

Nine 14" by 14" by 9" deep Cast Iron Jackets, 4° Taper; Jackets extend 1¾" on Drag, 7¼" on Cope.

Whiting Wishbone Charger & Buckets.

Modern 400" Cylindrical Ladles with Cover.

PAUL PUFAHL & SON FOUNDRY
COMO AVENUE, S. E., and CITY LIMITS MINNEAPOLIS 14 MINN.

CENTRIFUGAL COMPRESSORS

7000 CFM, @ 1¼ lbs. pressure, Ingersoll-Rand, type F S, driven by a 60 HP, Westinghouse 220/440 volt 3600 RPM motor.
2100 CFM @ 12 oz. General Electric with 10 HP 220/440 volt 3450 RPM motor.

Pressure Blowers

(2) 1200 CFM @ 11 oz. Buffalo, 9¼" intake, 7" x 7⅛" outlet, with 7½ HP 3/60/1800 RPM motors.

THE MOTOR REPAIR & MFG. CO.,
1552 HAMILTON AVE., CLEVELAND, OHIO

FOR SALE

One second hand Stedman Type "B" 24" x 20" Rolling Ring Crusher with Chilled Liners, Manganese Rings and Cage Bars, Cast Iron Construction. Also one second hand Stedman Type "B" 24" x 20" Rolling Ring Crusher arranged for flat belt drive, all steel construction, having cast steel housing and liners. Machines in good operating condition and may be inspected at our plant.

BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY
BIRDSBORO, PA.

FOR SALE

One (1) Type GD-1 Size 3 Pangborn Barrel Sand Blast. In good operating condition.
Price $450.00
as is, f.o.b. Burlington, Iowa. Address: Murray Iron Works Company, Burlington, Iowa.

FOR SALE

1—24-inch Davenport Jolt Roll-Over Draw Molding Machine
1—13-inch Jolt Squeeze International Molding Machine
1—10-inch Jolt Squeeze Adams Molding Machine

KRAUSE MANUFACTURING COMPANY
HUTCHINSON -:- KANSAS

REBUILT EQUIPMENT IN STOCK
IMMEDIATE SHIPMENT

(2)—¾" cap. Power Sprue Cutters.
(1)—10" Tabor Post Type Squeezer.
(2)—Heavy Duty double end U. S. Elec. Grinders 440-V-3-Ph-60-cy.

ELECTRIC MONORAIL HOISTS

Cap.	Make	Current	Remarks
(1)—½-ton	Detroit	220/3/60	Var. Speed
(1)—1-ton	LoHed	220/3/60	Single Speed
(2)—1-ton	Euclid	115-VDC.	Single Speed
(3)—1-ton	Shepard	230-VDC.	Var. Speed
(3)—2-ton	Shepard	230-VDC.	Var. Speed
(3)—2-ton	Shepard	230-VDC.	Two Motor
(1)—4-ton	Shepard	230-VDC.	Two Motor
(1)—6-ton	Sprague	230-VDC.	One Motor

SPECIAL: 2—1-ton Shepard Hoists, arranged for stationary mounting, 7½-HP. motor, 220/440-VAC. Var. Speed, separate controller, 32-ft. of cable, suitable for use as winches, car puller to operate furnace doors or elevator.
SPECIAL: 2—7½-ton Shepards, Fl. or Cage Operated, 230-VDC., 20-HP. hoist motor, 28/70-FPM. 10-HP. trolley motor, 350/400-RPM 40-ft. lift.

AIR COMPRESSOR

(1)—9 x 8 Chicago, N.S.B., cap., 178-CFM @ 100 lbs. with 25-HP., 220/440-VAC. motor and control.

BUCKETS

(1)—¾-yd. 2-line Browning type Z-1½.
(2)—¾-yd. Hayward Electric 220-VAC.
(2)—1½-yd. Hayward Electric 230-VDC.
SPECIAL: 3-ton Size "P" Electromelt Steel Melting Electric Furnace, complete with 1500-K.V.A., Allis-Chalmers O.I.W.C. Transf. 13200/3/60-cy., all necessary control equipment, panels, etc. REBUILT, GUARANTEED, IMMEDIATE SHIPMENT.

OVERHEAD ELECTRIC TRAVELING CRANES

Cap.	Make	Span	Current
(1)— 3-ton	Shaw	30'0"	230-VDC.
(1)— 2-ton	C. & M.	30'0"	220-VAC.
(1)— 4-ton	Shepard	30'11"	230-VDC.
(1)— 5-ton	Box	40'0"	230-VDC.
(2)— 5-ton	Niles	40'0"	230-VDC.
(1)—10-ton	Bedford	48'0"	230-VDC.
(1)—10-ton	Whiting	80'0"	220/440-VAC
(1)—10-ton	Chesapeake	80'0"	230-VDC.

(3)—3/5-ton J.b Cranes, 23'9" masts, 19'2" boom, wired and complete with 2 to 5-ton, one or two motor 230-VDC. hoists.
(1)—15/10-ton, 80'0" span, McMyler Gantry Crane, A.C. or D.C. suitable for 2-line bucket service.

WE OWN AND HAVE ALL THIS EQUIPMENT IN STOCK, IT IS OFFERED REBUILT IN OUR LARGE MODERN PLANT AND FULLY GUARANTEED.

T. B. MacCABE CO. 4304 CLARISSA ST.
PHILADELPHIA 40, PENNA.

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WELDING, CUTTING EQUIPMENT. Torches, Regulators & Gauges, Aircraft Welding Outfits and Torches, Lead Welding Outfits and Torches, Soldering Outfits, Acetylene Generators, Supplies. Electric Arc Welders, Electrodes.

SUPERIOR OXY-ACETYLENE CO.
HAMILTON, OHIO

FOR SALE

3—Core Blowing Machines used but in good condition. Make an offer. Address: Forest Hill Foundry Co., 95 Tiffany Blvd., Newark, N. J.

PANGBORN SAND BLAST

Type G.D. No. 3. 14 cu. ft. barrel capacity Direct pressure blast application. Including drawings and instructions. Never installed. Low price.

THE GREEN FUEL ECONOMIZER CO. INC.
BEACON, N. Y.

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.
ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

TANKS BOUGHT AND SOLD

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

REBUILT
BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder and dust exhausters. Ventilating fans.

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FOR SALE

DETROIT ELECTRIC MELTING FURNACE
Type LFA 350
Complete with Transformers and all Accessories
Write for Specifications

GLOBE TRADING COMPANY
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CORE SAND MIXER

New Blystone model B-2½, 11 cubic feet capacity, clutch pulley drive. Available for immediate delivery.

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910 N. Marshfield Ave. Chicago 22, Ill.

SPECIAL VICTORY BARGAINS

Cast Iron and Steel Plate Mill-Dust & Shavings **Exhausters** 50 in stock. **Cupola and Furnace Blowers** for Coke, Oil or Gas Combustion.
1—Spencer Blower 2250 C.F.M.—1½ lbs.—25 H.P. 3/60/220 or 440 AC.
2—Sprague 4 Ton Electric Hoists 115 V. D.C.

MELTING FURNACES

2—Walker-York coke fired crucible furnaces for up to No. 80 crucibles—blowers attached.
1—US Rotary No. 3—Melting or Smelting.
1—Pair Monarch-Rockwell's—Rotating, each 500 **lbs. cap.** mounted together on base, oil burners available, when used together waste heat from one preheats other.
1—Hausfeld open flame, non crucible 400 lbs. **brass** capacity or equivalent volume for Aluminum.
1—Stationary for No. 70 crucible.
1—Schwartz, size 42" class A—for oil fuel.
Tumbling Mills—2 cast iron for brass cleaning.
1—Sly 48" x 60"—1" thick round steel shell.
1—36" dia. x 60" round steel shell.
Core Ovens: Small portable.
1—Core Sand Mixer.
1—Blystone—7 cu. ft. capacity size, belt driven.
Molding Machines:
1—Battenfeld stationary 12" cyl., plain squeeze.
1—Arcade portable plain air squeeze.
1—Stationary 24" x 18" small jolt table for cores.
1—Tabor jolt Table No. B-18 54" x 98".
1—Osborn No. 405 stationary jolt-rollover draw.
1—International 26" x 36" type F jolt-rollover-draw.
Compressors:
Bury—12" x 10" modern valves—350' cap. 100 lbs.
1—Chicago 12" x 8" 240' cap., 70 lbs.
Gardner 4½" x 4½" Vertical 19'.
Tested-air receivers—12" up to 36" dia.

CLIFTON MACHINERY CO.
1023 W. 6TH, CINCINNATI 3, OHIO

SCULLY Reconditioned Foundry Equipment

★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN MACHINE SHOP

MISC. MOLDING MACHINES

No. 112 Arcade portable jolt roll-over and squeeze, pattern draw, table accommodates pattern plates up to 13 x 33"—9" draw, distance between uprights 36".

Arcade No. 10-040 jolt roll-over and squeeze, pit type, 44" distance between uprights, 20 x 34" jolt table, 7" jolt cyl., 18" draw, 42" distance head to swing table.

22" Tabor portable, jar roll-over and draw, 22 x 32" roll-over plate, 600 lbs. cap @ 80 lbs. pressure, 10" draw.

No. 602 Osborn jolt roll-over draw, portable, 24 x 30" flask cap., 900 lbs. cap. @ 80 lbs. press., 10" draw.

No. 28 Davenport jolt roll-over draw, 26½ x 39¼" table-pattern draw 12"—jolt cyl. dia. 8"—1500 lbs. cap. @ 80 lbs. press.

Pridmore 30 x 42" power turn-over and drop Electrically operated 24 x 32" jarring machine, 2 HP 220V AC Motor.

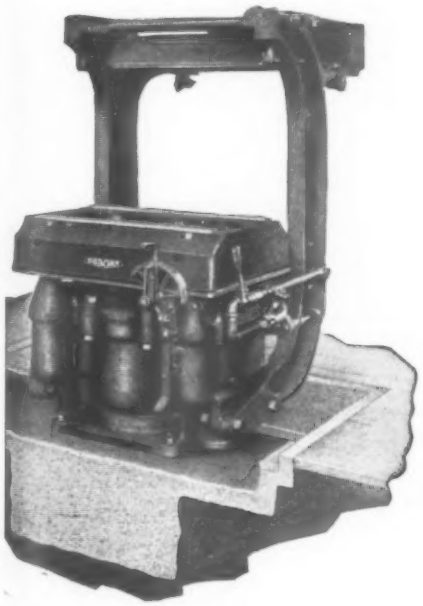
PLAIN AIR SQUEEZERS

Tabor stationary, 32" between rods, 10" dia. cyl. 18 x 18" table.

Davenport, 33" between rods, portable straddle type, 10" cyl. 14 x 20" table.

Tabor, portable, 32" between rods, 10" dia. cyl. 16 x 17" table.

OSBORN JOLT SQUEEZE & POWER STRIP



No. 703 OSBORN

(Similar to above excepting with roll-off)

No. 703-6 Osborn jolt squeeze and strip, 21 x 29" table, stationary. Length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolting cap. @ 80 lbs. press. Distance from lifting frame to squeeze head 24¼", flask length 44¼" with roll-off conveyor.

No. 703-5 Osborn, same as above, excepting 17 x 35" table.

PLAIN JARRING MACHINES

60 x 60" Tabor, 14" dia. cyl., 8500 lbs. cap. @ 80 lbs. press.

42 x 60" Tabor, 13" dia. cyl., 7500 lbs. cap. @ 80 lbs. press.

JOLT SQUEEZE STRIPPERS

No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 36" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap., 24 x 36" table pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty, JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14", jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

JOLT STRIPPERS

Osborn No. 550-22 pit type JOLT STRIPPER, stationary pin centers 16 x 32"—table 32 x 36".

Osborn No. 550, max. flask cap. 36" length 26" width, 16" pattern draw, 750 lb. jolting cap.

CORE TURN-OVER MACHINES

Pridmore Type "H" 22 x 18—8" drop, portable rock-over drop.

MISC. HAND ROLL-OVER MACHINES

Tabor, portable, hand roll-over, hand draw, 1—16-18—8" draw, 1, as above, 20-22—8" draw.

Grimes Model A-112 hand rammed, roll-over, max. cap. inside of flask 20 x 42"—12" draw.

ELECTRIC SAND RIDDLES

Coombs Type "V" 21" dia. equipped with 110V AC single phase Motor.

Coombs "CS" 24" sq riddle, equipped with 1/3 HP 3/60/220-440V AC Motor.

Lowe Hi-Speed, 20" dia., equipped with 3/60/220-440V AC Motor.

POSITIVE PRESSURE BLOWERS

No. 4 Roots, 14 x 48" — 13 ft. displ. 14" top discharge, pulley drive.

24 ft. Connersville, 18 x 54" — double geared, 18" top discharge, complete with 20 HP Wagner 3/60/220V AC Motor.

No. 6 Piqua, 21 x 60" — 35 ft. displ. 20" top discharge, single gear, mounted on bed plate (without motor).

Pangborn 6 ft. dia. TYPE EH-1 CABINET TABLE INSTALLATION, 5 ft. high partition, Abrasive Handling and Reclamation System, Belt and Bucket Type Elevator, Sandblast Pressure Tank.

AMERICAN SANDCUTTERS

Cleveland-American (similar to Model "K" 84" spiral cutting cyl., 36" dia., 92" between tractor wheels 5" face, 6' dia.—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

American Model "CP" size 72, having 72" cutting cyl., 90" between tractor wheels, tractor wheels 50" dia., 5" face, equipped with Hercules Gas Engine.

OVERHEAD ELECTRIC TRAVELING CRANES

10-ton approx. 30'7" span, 3-motor type, Northern Electrical 115 V. DC Motors, Hoist 15 HP 750 RPM, Rack 3 HP 1200 RPM, Bridge 7½ HP 950 RPM, EC&M Controllers, cage oper., 24" double "I" Beams, cast iron truck ends, chain lifts.

1½-2 tons, Detroit Lohed room Type "H" approx. 27'5" span, 3-motors, 220 V. AC, 15" "I" Beam Girders, lift approx. 10 ft., total hd. room required app. 40".

1-ton Euclid 1-motor single "I" beam girder hand operated CRANE, equipped with Electric Hoist 3/60/440 V. AC Motor, approx. span 30 ft.

1-ton Detroit Type "H" Lohed Room, approx. 29 ft. span, 12" double "I" beam girders, 9 ft. lift, floor control Watson Induction Type "KH" 3/60/220 V. AC Motors, approx. 40" clearance.

3-ton MILWAUKEE 3-motor Type "C" GANTRY CRANE (suitable for 5-tons) 230 V. DC Motors, lattice type girders, structural end trucks, enclosed cage at one end, approx. span 31'6", lift 25 ft. overhang each side approx. 12 ft., single drum parallel with bridge girders, including ½ yd. single line perforated BUCKET for same.

5000 lb. 2-motor 220 V. DC P&H Special Cupola Charging CRANE equipped with swivel trucks (steel) for operating on lower flange of 15" I-Beam—approx. 25' vertical lift.

ELECTRIC HOISTS

3-ton P&H Type "U" with MOTORIZED TROLLEY, 220 V. D.C. Motors, 15 ft. lift, speed 15 FPM.

3-ton Link-Belt single point suspension with Top Hook (or can add Trolley if required). Floor operated, mechanical lowering brake, 18' lift, speed 18 FPM, equipped with 115 volts, DC motor, or can rewind for 220 V. DC service.

5-ton Shepard Form 1 Class B-6 equipped with 6 HP 220 V. DC motor, floor control, 15 ft. lift, speed 15 FPM.

MISCELLANEOUS

Blystone 9-11 ft. MIXER, clutch pulley drive-side discharge, complete with 10 HP GE KT-751 220V AC 1800 RPM Motor.

Whiting 42" dia. x 60" long 1" plate EXHAUST MILL, door opening entire length of mill, clutch pulley drive-spur gear type.

Hausfeld Style 1000, 100# cap. stationary ALUMINUM FURNACE, with cast iron pot, gas-fuel oil.

SCULLY MACHINERY & EQUIPMENT CORP.

2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO 36, ILLINOIS

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It is also an excellent core box parting—ideal for cleaning and preserving core boxes. For cleaning, apply lightly and wipe off with a rag. For storing and preserving core boxes, apply lightly and leave on.

COLUMBIA PARTING—A genuine Tripoli parting that can't be beat. It overcomes the tendency of sand sticking or clogging in the corners of patterns, thus, even the most intricate lifts are easily and perfectly made. Gives excellent results on molds for grey or malleable iron, brass, bronze, aluminum or steel. Works equally well on cold or hot sand.

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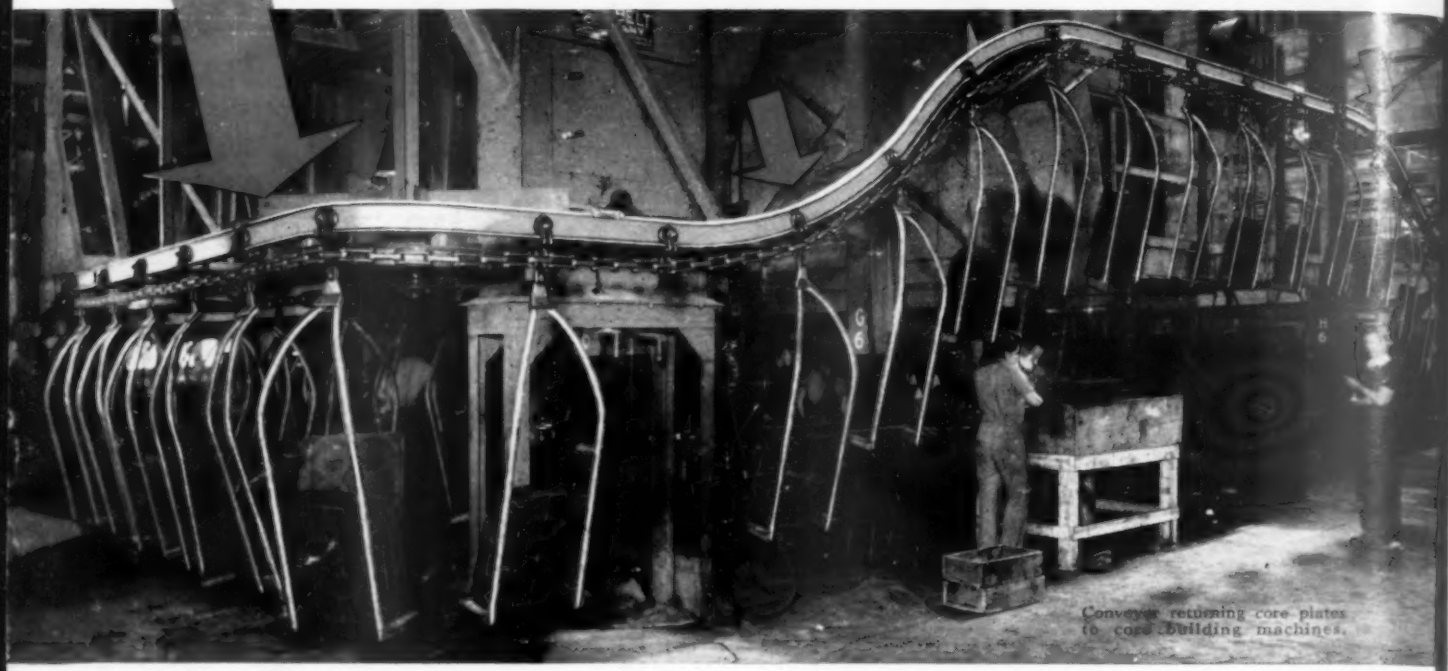

Conveyor returning core plates to core building machines.

● More than 5000 ft. of Link-Belt Overhead Trolley Conveyors, in their Benton Harbor, Mich. plant, eliminate lost motion and keep production "on the move." Handling core plates to the core makers; cores from the drying ovens and direct to the assembly of molds; and castings from annealing furnaces through monitor to cool and to the shot blast, is performed by this modern overhead trolley conveyor system.

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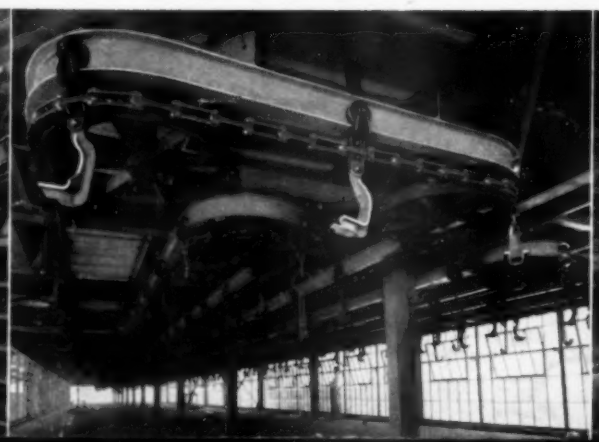
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